# PRECISION METAL MOLDING

INCLUDING DIE CASTINGS MAGAZINE

DESIGN • MANUFACTURE • FINISHING • USE

# VELVAGLAZE

MONARCH VELVAGLAZED DIE CASTINGS USED ON THE GENERAL ELECTRIC CANNISTER CLEANER

## Cuts Finishing Costs...

## AND IMPROVES PRODUCT QUALITY

Velvaglaze is now used by leading manufacturers to obtain a more durable, brighter surface finish that improves product sales appeal. Velvaglaze resists scratching and marring experienced on normal cast aluminum surfaces.

Velvaglaze is available exclusively on Monarch aluminum Permanent Mold castings and aluminum Die Castings. Investigate the substantial savings you can obtain over other comparable fine finishing methods using Monarch Velvaglaze castings.

*WRITE TODAY FOR FREE BROCHURE*

*"Here's How You Can Cut Die Casting Finishing Costs"*

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- *Aluminum Permanent Mold*
- *Aluminum Die Castings*
- *Certified Zinc Die Castings*
- *Complete Product Assembly*
- *Every Modern Finishing Service*

Detroit Ave. at W. 93rd St., Cleveland 2, Ohio


# CASTING NEWS NOTES

**THE INCREASING TREND** among American manufacturers to utilize the advantages and cost savings offered by Aluminum Permanent Mold castings and Aluminum Diecastings is emphasized by Department of Commerce monthly figures.

* * *

**PERMANENT MOLD AND DIECASTINGS** account for 60% of the current monthly shipments of all types of aluminum base castings with the tonnage between Permanent Mold and Diecastings running almost even. Unfilled orders, reported as of May 1952, indicate that this trend will continue in the months ahead.

* * *

**MONARCH'S UNIQUE POSITION** in both the Aluminum Permanent Mold and Diecasting field has a direct influence on these figures. We welcome an opportunity to clearly outline — without prejudice — the advantages that each of these modern production casting methods offer as an answer to your immediate casting problem.

* * *

The final choice between Permanent Mold and Diecasting methods of production should be based upon careful analysis of the following important factors:

**COST** — the final assembly cost of the casting with all variables considered.

**TOLERANCES** — factual evidence that casting tolerances can be maintained under full production conditions.

**PHYSICAL STRENGTH** — determine that required physical strength can be actually checked in production. Don't rely on "book values".

**SURFACE FINISH** — demand production evidence of surface quality required.

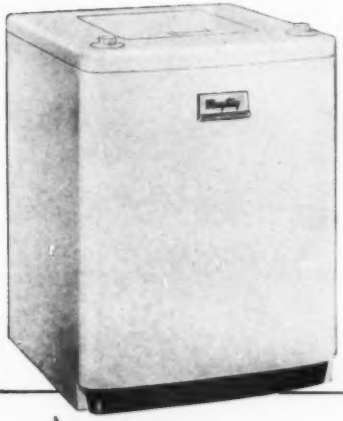
**PRODUCTION QUANTITIES** — analyze equipment capacity and flexibility of production method and source.

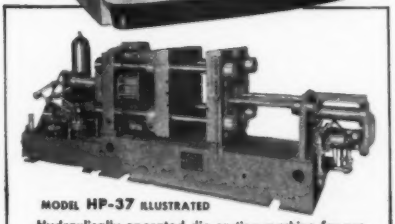
* * *

These are the factors that Monarch projects into every estimate that we formulate. We will endeavor to discuss each factor in greater detail in future columns. In the meantime, our experienced personnel are at your service to assist you in finding the correct answers to your casting problem. MONARCH ALUMINUM MFG. COMPANY, DETROIT AVENUE AT WEST 93rd STREET, CLEVELAND 2, OHIO.

# KUX

## FIRST NAME IN DIE CASTING MACHINES





MODEL **HP-37** ILLUSTRATED
Hydraulically operated die casting machine for production of aluminum castings.

Battery of KUX Die Casting Machines in operation in the ultra-modern Maytag factory at Newton, Iowa

**—helps make**

*Maytag*

**first name in washers**

**Since 1907,** over 6 million Maytag Washers have been sold—far more than any other. The reason's clear; Maytag makes a wonderful washing machine . . . plus a full line of other home laundry equipment and famous Dutch Oven Ranges. It's logical that KUX, first name in die casting machines, should be used in the quality production of these superior products.

The use of KUX die casting equipment can put YOUR PRODUCT ahead—or keep it ahead. Reduce your manufacturing costs—increase the saleability of your product, with quality die castings made on these rugged machines.

***Write for illustrated catalog showing complete line of KUX Die Casting Machines***

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**6725 N. Ridge • Chicago 26, Illinois**

# KUX

## FIRST NAME IN DIE CASTING MACHINES SELECTED BY FIRST NAMES IN INDUSTRY

*For additional information Circle No. 10 on the Reader Service Card*

# Die Castings by PRESSURE may be your answer!

Because PRESSURE —

—provides engineering and production facilities that operate as a division of your own business.

—furnishes a combination of men, machines and methods geared to meet your own production requirements.

—maintains an efficient operation that gives close personal attention to every job at all times.

—assures the kind of friendly business relations everyone seeks.

Here may be your answer to better die castings. Send us your inquiries. Write for descriptive circular.

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*die castings*

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SEPTEMBER 1952
Vol. 10 No. 9

# PRECISION METAL MOLDING

DIE CASTINGS • INVESTMENT CASTINGS • POWDER METALLURGY
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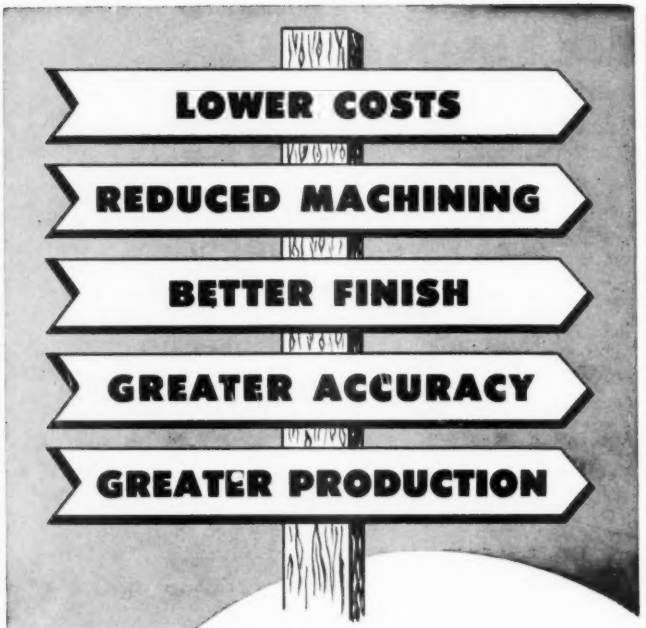


● Sign posts along the road to manufacturing efficiency point to the Newton-New Haven Co. as the single source for your die casting needs.

You can be sure you are headed in the right direction when you bring your die casting problems to Newton-New Haven. Here is an organization that has the equipment, the personnel, the experience and the whole-hearted desire to help.

*Newton-New Haven has prepared a booklet on "Dimensioning Die Castings." This is a basic data that every Engineer and Designer should have. Write on your company letterhead for your copy.*

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# LETTERS TO THE EDITOR

### ANTI-GALLING COMPOUND

We have not been successful in obtaining a quantity of "Ragosine", an anti-scuffing (anti-galling?) compound which may be British made. Can you help us locate a source of supply for this material?—J.L.

*We are not familiar with this material, but perhaps some of our readers can suggest a source. —Ed.*

### ZINC ALLOY VS DETERGENTS

Has any work been done in obtaining zinc alloys which would not be affected by detergents, or are any treatments available which would minimize the action of detergents on zinc die castings?—L.D.

*A number of washing machine companies use zinc die castings without special treatment for washing machine fittings, such as overflow valves and other components subjected to soap and detergents.*

*Two improved zinc alloys which meet ASTM specifications, especially with regard to control of trace impurities, have given stable, strong and reasonably corrosion-resistant zinc die casting alloys.*

*There are also a number of chemical surface conditioning treatments, most of them proprietary, which are intended primarily for the corrosion-protection of zinc die castings. A list is forwarded. Both phosphate and chromate type chemical dips are available which will protect zinc at low cost.—Ed.*

### PLASTER MOLD CASTINGS

Have noted with interest your article on plaster molding. Would appreciate your advising several leaders in the field, particularly concerning yellow brass castings.—J.W.S.

*List of leading plaster mold casters who work in brass has been forwarded.—Ed.*

continued on page 6

# *Who's Conservative?*

Now don't get us wrong!

What we mean by "conservative" doesn't have a thing to do with your taste in bow ties, or how hard you'll root at the homecoming game next fall. This is a different kind of conservation story . . . one that's told in terms of men, money and materials.

The success of your company depends on just how "conservative" you are!

For more than a quarter century KIOWA know-how has enabled manufactures to do a better, more economical job with the business budget.

Here is another example of how . . .

The bronze oilite bearing was inserted (at the left) and cast all in one operation. This KIOWA service of casting inserts into the part effects a great savings in labor and materials for the Chamberlain Corporation of Waterloo, Iowa.

- **Zinc Base Die Castings**
- **Brass, Bronze, Aluminum Sand Castings**
- **Aluminum Gravity Die Castings**

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MARSHALLTOWN, IOWA

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# here's real news!
# for all DIE CASTERS

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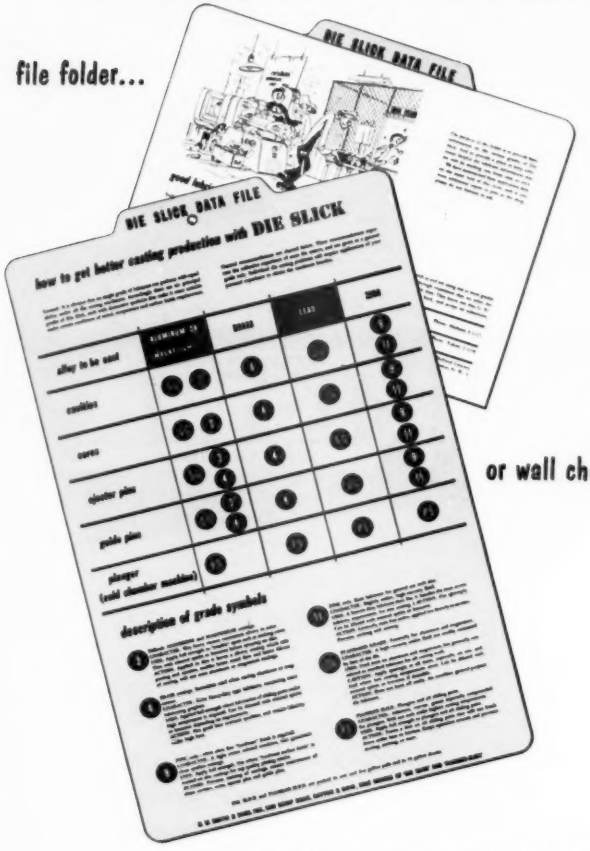
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or wall chart!

Write today!

It's the new DIE SLICK DATA FILE, a condensed library of die casting die lubrication information together with a listing of the best lubricants for the job requirements. It's the result of many years' experience in working with die casters everywhere. Ask for your copy now (on your company letterhead, please). No charge—no obligation! You'll save time and money, too, when you standardize on Die Slick.

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LETTERS TO THE EDITOR
continued from page 4

### IRON POWDER

We would appreciate the pamphlet entitled, "Hydrogen Reduced Iron Powder" by R. H. Rodrian of the C. K. Williams Co. If you do not have the pamphlet would you kindly let me know where I may obtain it. —E.L.H.

*The paper on hydrogen reduced iron powders was delivered by Mr. Rodrian before the recent meeting of the Metal Powder Association in Chicago, and is published, along with other papers presented at the meetings, by the M.P.A. Copies can be purchased by writing to the Association at 420 Lexington Ave., New York 17, N. Y. —Ed.*

### SOURCE OF IRON POWDER?

I have been following your recent articles on the "Use of Iron Powder Parts" and have found them most interesting. In fact, it aroused my interest to such an extent that I felt I should write you regarding some advice on this subject.

We do quite a bit of shot blasting of metal parts in our company. An angular grit iron shot is used in metal parts such as as aluminum, molybdenum, steel, brass, etc.

The excess, or waste shot, along with the powdered metal removed from the parts is then removed and sold for scrap. As much as six tons of shot have been used in one month.

What I am interested in, of course, is whether or not this powdered iron waste (even though it is mixed with other metals) can be used in powder metallurgy.

I've had our Purchasing Department contact suppliers of our shot to request their assistance in utilizing this waste product. They were unable to suggest any other means of sale

continued on page 74

# Serving American Industry

## with CONTROLLED QUALITY Zinc Base Die Casting Alloys

From raw metal to ready-to-cast alloy, close laboratory control is exercised over the purity and processing of materials.

Alloys that are dependable — right down to the last decimal place — are guaranteed by the modern quality control equipment used by H. Cohn & Sons, Inc. Every ingot of zinc alloy is manufactured to meet the rigid requirements established by the die casting industry.

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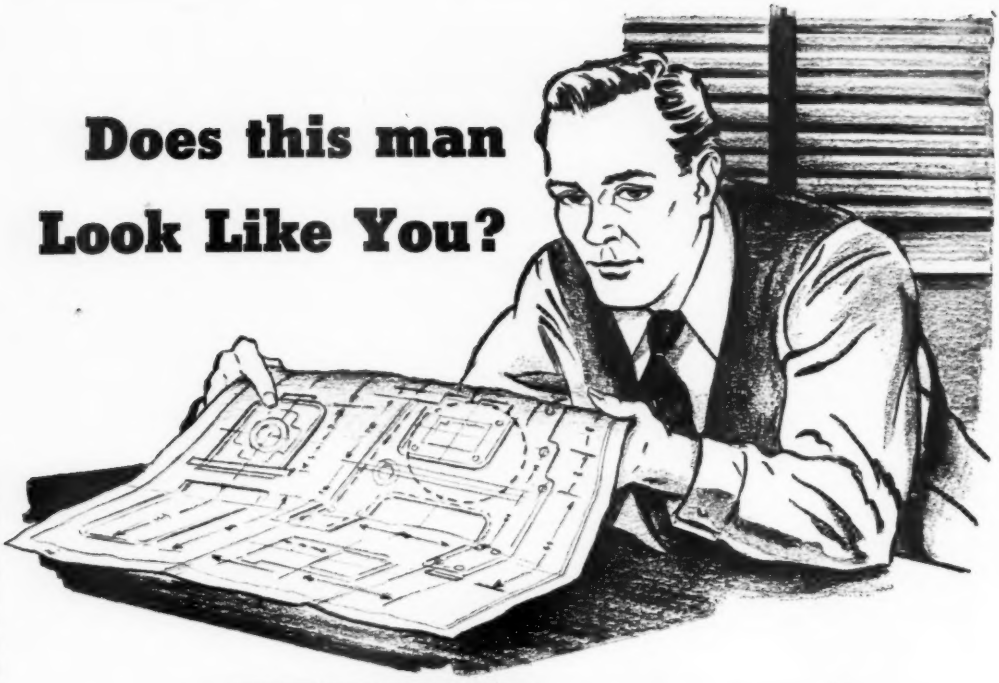
# Does this man Look Like You?



# at PARKER he is you!

THIS man takes **your** place at Parker. His title?—Testing Chief. At regular intervals during the production of your die castings, your "representative" checks material tests, designs, tolerances and specifications. He is constantly watchful that your exact requirements are being met. He is literally serving two masters—for through his careful scrutiny of every job your satisfaction is guaranteed, and Parker's facilities are kept at a peak of efficiency. This is another instance where Parker's half-century of experience pays off for **you**. Call the Parker representative on your next die casting problem.

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*And when you think of Die Castings* **- - THINK OF**

**Parker White-Metal Company • 2153 McKinley Ave. Erie, Penna.**

**PARKER ALUMINUM *and* ZINC *Die Castings***

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# *Independent Fabricators* rely on Kaiser Aluminum engineers for expert technical advice and engineering assistance on any aluminum casting or extrusion problem. This service is immediately available to help you make better use of Kaiser Aluminum.

▶ Aluminum pig specification ingot, extrusion billets. Sales offices in principal cities. Kaiser Aluminum & Chemical Sales, Inc., Oakland, California.

# *Kaiser Aluminum*

**A major producer of aluminum pig, specification ingot and extrusion billets**

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A reliable source for die casting requirements

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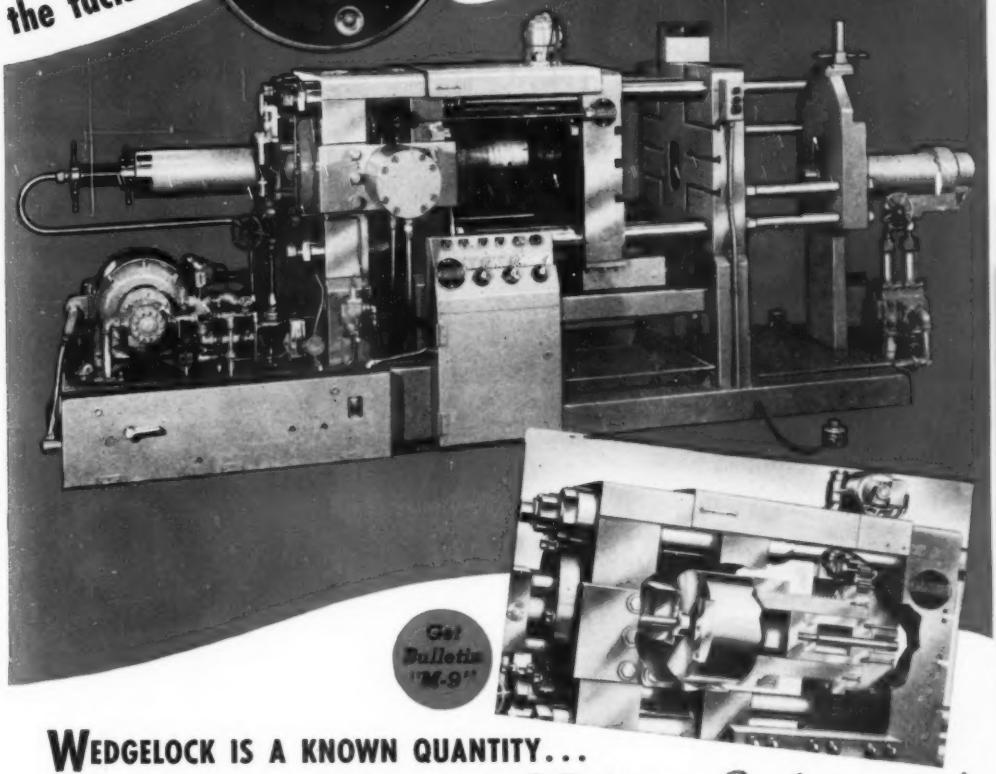
Get ALL the facts on WEDGELOCK

A *Premium-Built* DIE CASTING MACHINE



Get Bulletin "M-9"

# WEDGELOCK IS A KNOWN QUANTITY... the product of a *25-Year Background*

Deliberately, Wedgelock was designed to produce denser castings and more of them, to cut maintenance and down-time, and to deliver longer, trouble-free service. The die opening can be set at any point from 10" to 15". A shallow cavity can be run at a 10" opening for faster cycling and increased output. Motorized central screw adjustment (exclusive) regulates die height, making possible adjustments to .001". No toggle links to wear and replace; hydraulic ejection built into machine. Adjustable relief valve permits adjustments for 1000 to 2000 p. s. i. on shot cylinder. Pressures up to 40,000 lbs. are held without flash. Powerful hydraulic cylinders insure positive, direct locking; dense, solid castings and longer die life. *Get all the facts NOW.*

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*Cuyahoga Industries* 17920 WATERLOO ROAD CLEVELAND 19, OHIO

FOR SOUND, USABLE DIE CASTINGS

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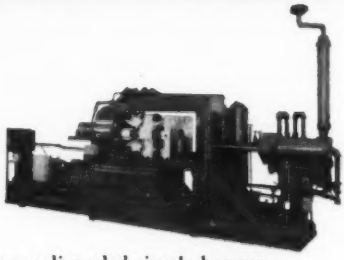
# Super Dense Die Casting a wild-goose chase?

Cross section of aluminum die casting (end plate for air brake vacuum cylinder) about 4/5 actual size



# *not on a LESTER!*

Many logical applications for aluminum die castings are discarded simply because some die casters don't have the right machines to do the job. But a whole new field of applications is opened, when you consider the work being done on Lester-Phoenix cold chamber machines equipped with a Pre-fill. Take the experience of Bendix Products Division of Bendix Aviation Corporation, for example. The part shown here is an end plate for an air brake vacuum cylinder—a critical application that demands a super-dense die casting, thoroughly sound and leak-proof.

To meet these high standards, Bendix turned to their Lester-Phoenix die casting machines. We are now informed that they are elated over the results obtained on their HHP-3X machine. They report that the castings are *unusually dense in structure,* and show *no signs of porosity whatsoever.*

We know that you, too, are interested in getting quality die castings and trouble-free, economical performance: so, write for complete specifications. And ask for a free copy of the Lester Press.

## LESTER-PHOENIX DIE CASTING MACHINES

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# IT ALL ADDS UP TO THIS...

A quarter of a century's experience gained in making billions of metal powder parts, plus our thorough knowledge of our business, adds up to real and tangible benefits for our customers.

The result of our experience and knowledge is a constantly widening choice of materials and applications. The results of our research are techniques that produce closer tolerances, improved physical properties and more complicated designs.

It all adds up to the fact that metal powder parts made by Moraine do more and better jobs each year . . . that they are produced faster and at lower cost.

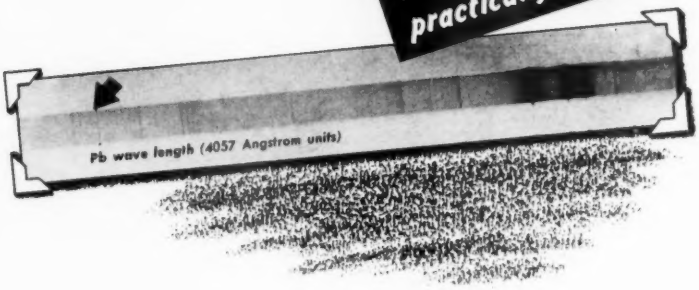
*Metal Powder Parts by Moraine*

## MORAINE PRODUCTS

DIVISION OF GENERAL MOTORS
DAYTON, OHIO

# CANDID SHOT

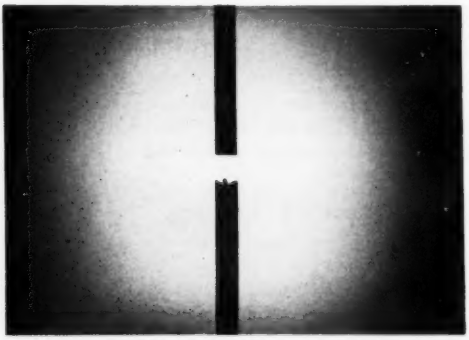
**. . . of Bunker Hill, the practically lead-free Zinc!**




Examination of the spectrum emanating from the vaporization of the zinc sample and recorded on spectrographic plate quickly reveals the chemical content of the sample. The spectral lines indicate which elements are present and to what extent. Iron, lead and cadmium are the most commonly found impurities, but by far the most harmful from the standpoint of die casting is lead. Note the "lead" line of Bunker Hill zinc. It is hardly visible. It tells the story of an exceptionally low lead content in a zinc running consistently 99.995+% pure.

Bunker Hill, the first commercially available four-nines metal has never failed the die casting industry in consistency of purity. The elimination of lead from zinc was a notable advance in the art of zinc refining, and the enormous expansion in the use of zinc base die castings is the direct result of this outstanding metallurgical achievement.

**DIE CASTING is the Process . . . ZINC, the Metal . . . BUNKER HILL, the Preferred Zinc**



A spectrograph is basically a picture of a spark. All elements, when "excited" by heat or electrical discharge, emit radiations of known wave lengths, usually measured in Angstrom units (Å). In spectrography, this light is dispersed into its component parts (the spectrum) and recorded on a photographic plate. The wave lengths are always the same regardless of what other elements are present in the substance under investigation, and since these wave lengths are accurately known it is possible to identify each line in the spectrum and thus gain a complete knowledge of the composition of the metal. The density of the spectral line bears a direct relation to the amount of the element present, therefore the spectrograph also provides a basis for quantitative analyses.

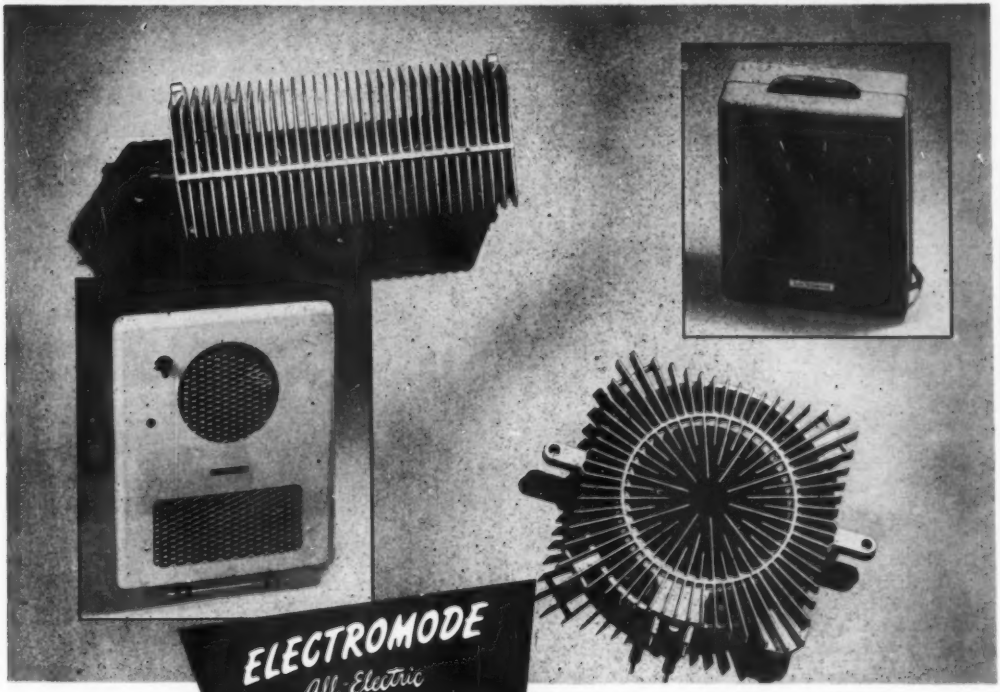
Eastern Sales Agents: **ST. JOSEPH LEAD CO., 250 PARK AVE., NEW YORK 17**

# BUNKER HILL 99.99+% ZINC

Sales Office for Pacific Coast: **NORTHWEST LEAD CO., SEATTLE, WASH.**

# No Problem's Too Tough

## *when you call in* ... PRECISION




**PRECISION Casts These Elements For —**

The Electromode patented die cast aluminum Safety-Grid heating element, illustrated above, consists of a nickel chromium resistor wire, insulated with a fused oxide powder, encased in a seamless metal sheath, and die cast in the finned aluminum casting, which completely seals the element.

Because of the high thermal conductivity of aluminum and the finned shape of the casting, the Safety-Grid dissipates heat rapidly, but stays at a relatively low operating temperature. Practically impervious to corrosion and oxidation, it will far outlast ordinary open wire elements.

In producing these aluminum die castings, Precision demonstrated these abilities:

- Superior casting techniques made possible the production of castings requiring highly complicated coring methods.
- Production of die castings with multiple thin sections.
- Assurance of an unfailing supply of die castings to the customer.

*Since 1909 the name "PRECISION" has been the symbol of highest quality in the die casting industry.*

**PRECISION CASTINGS CO., Inc.**
212 Walnut St., Fayetteville, N. Y.
Syracuse, N. Y. · Cleveland, O. · Kalamazoo, Mich. · Chicago, Ill.
British Affiliation — Wolverhampton Die Casting Co., Wolverhampton, England

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# USCO

For 48 years, pioneers in aluminum development.

USCO K Aluminum Alloy (AXS-679 Rev. 3) is one of several standard Cu-Si die-casting alloys produced to exact specifications under our famous Production Control System . . . a guarantee to you of consistent high quality. If you prefer, we can produce promptly an aluminum die-casting alloy to your exact specifications.

USCO K will give you the mechanical and physical properties you desire with the result you'll have fewer rejects and increased volume . . . money in YOUR pocket!

Our metallurgical engineers, who have a practical working knowledge of your problems, are at your service always.

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East Chicago, Indiana

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# 1,300,000 CASTINGS FROM THIS DIE-

## Since Sept. 1947

CASE HISTORIES FROM MT. VERNON FILES

Here at Mount Vernon, we are proud of our long-lived dies that "stand the gaff", exceed normal life expectancy despite the severe punishment of continuous operation. The one pictured has duplicated the casting shown more than 1,300,000 times—and this die is still in use.

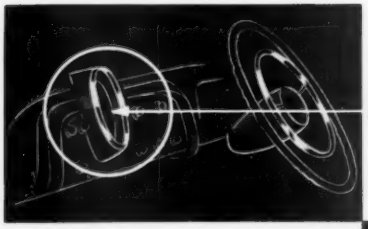
Die casting affords two outstanding production economies: (1) rapid production; (2) reduced machining and finishing.

Both advantages are fundamental factors in establishing lower unit costs. But the degree to which savings may be realized depends upon the quality of the workmanship in making the dies and the care with which they are used. Dies that retain their accuracy for longer periods—yield clean, flawless castings day in and day out—quickly write off initial costs, and reduce ultimate costs appreciably.

If you have not already profited by the economies to be gained from die casting, consult with us. We are confident that, with our comprehensive experience, skills and modern facilities, we can show you the way to increased output at lower cost.

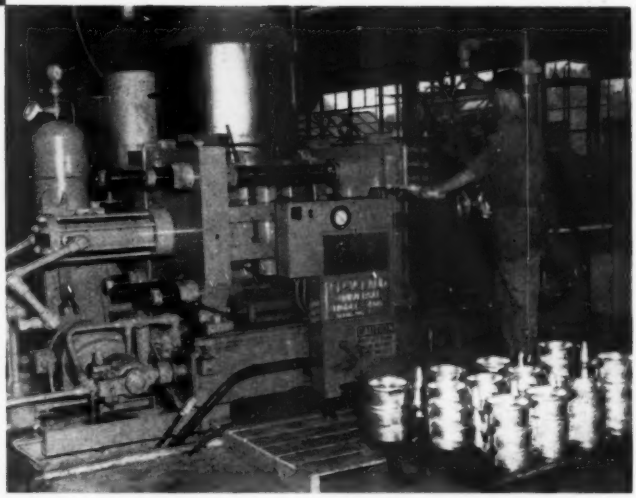
Produced for The Apex Electrical Mfg. Co. Cleveland, Ohio

*For additional information Circle No. 15 on the Reader Service Card*



# 426 MPH*

## in a CLEVELAND die casting machine!



* That's the actual figure, but the abbreviation stands for units *made* per hour — in the Cleveland Die Casting Machine shown at right. Working in the ultra-efficient King-Seeley plant at Scio, Michigan, this Cleveland machine is speeding production of automobile dashboard instrument parts. The part being produced, an instrument cluster housing, is shown below, "as cast."

King-Seeley uses zinc die castings extensively for such parts as the horn ring shown below; housings for telegages (water temperature, fuel level and oil pressure); bezels; small intricate frames; and speedometer and gauge components. Chances are your car has several King-Seeley products in it.

*King-Seeley Corporation,* leading supplier of dashboard instruments to major automobile manufacturers, is widely known for excellence of product design and construction; for high efficiency in manufacturing methods. To maintain critical standards in its die casting department, King-Seeley relies on a Model 400 Cleveland to produce top quality castings at high speeds.

Typical of the parts produced on this Cleveland machine is the instrument cluster housing shown above. Approximately six pounds of zinc alloy are injected into the die, producing two parts per shot. The Cleveland's powerful die locking pressure and high injection speed produce sound, dense, *"hardware finish"* castings. Dimensions are held to close tolerances. Secondary drilling operations on the part have been eliminated by precision coring of 13 holes. Production averages 213 shots—426 parts —made per hour.

To get the *most* from *your* die casting department—in speed of production and quality of casting—profit from the experience of leading die casters and investigate the advantages of the Model 400 Cleveland. Your inquiries will receive prompt attention. For machine specifications, write for free copy of bulletin.

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# PERMANENT MOLDERS!
# DIE CASTERS!

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WHEN YOU CAN . . .

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### With DME STANDARD EJECTOR PINS

By keeping on hand a ready supply of the most often required sizes of D-M-E STANDARD EJECTOR PINS, the men responsible for increased production have effectively reduced costly delays and kept production rolling.

D-M-E's use of superior steels, coupled with the most advanced methods of manufacture bring to the industry an ejector pin that conforms to the most rigid molding requirements. These same advanced production methods of manufacture make D-M-E EJECTOR PINS available at prices which put "home-made" pins at a premium.

Now is the time to contact your D-M-E Branch and Stock Up on . . .

*The Finest Ejector Pins Made!*

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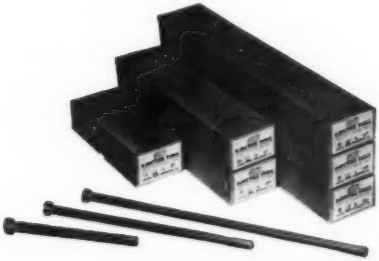

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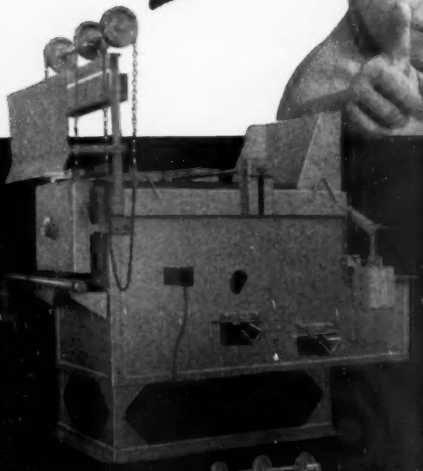
*For additional information Circle No. 6 on the Reader Service Card*

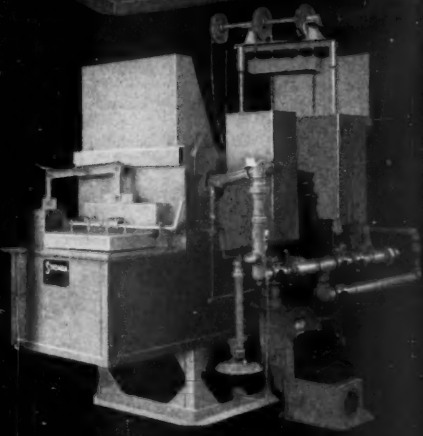
# Look! It's Our Baby!

# NEW STROMAN DOUBLE CHAMBER "DC" ALUMINUM MELTING FURNACE

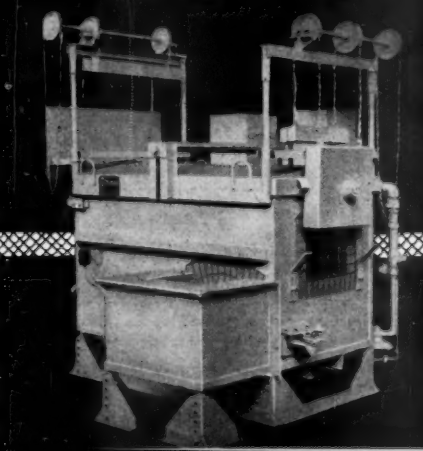
## For Die Casting • Sand Casting or Permanent Mold Plants



Rear and side view Showing Charging Door



Front and side view Dip-out well in front



Front and side view Dip-out well on side

This revolutionary type furnace for melting and holding aluminum is composed of two separate chambers combined into a single unit. One chamber is for melting only, where the ingots or returns are completely covered by flame as they are fed into the charging door and all capilatory moisture is driven out before the metal melts and runs into the holding chamber. Metal usually flows into the holding chamber at between 1160—1180 degrees. Cold, or moist metal NEVER reaches the molten bath. This eliminates gas pick-up and the resultant fault . . . porosity. The holding chamber is heated separately from the melting chamber to assure correct pouring temperature. Both chambers have automatic temperature controls, to eliminate manual miscalculations. Metal in the holding chamber can be controlled to within plus or minus 10 degrees, as it is constantly fed from the melting chamber with metal of a constant temperature.

Another outstanding feature is that it eliminates hard spots in the molten bath, and the bath can be held day in and day out without tapping, and show no ill effects. With a "DC" Aluminum Furnace you can do away with the tasks of tapping and making ingots at night and time wasting heating-up in the morning. Fuel costs for keeping metal at correct temperature overnight are negligible in comparison to time wasted in the old way. Man hours are costly and hard to find . . . conserve them!

An exclusive feature that die casters and permanent mold founders will find a great convenience and economy is the fact that REJECTED CASTINGS CONTAINING INSERTS can be remelted in the "DC". It sweats the aluminum off the insert in the melting chamber and leaves the insert where it can easily be raked out of the charging door.

Separate melting and holding in one unit also keeps fuel costs at an astounding low . . . as metal does not lose temperature in transport from melting to holding furnaces and there is no preheating of holding crucibles. With a "DC" constant, efficient, flawless and most economical castings are assured.

Capacities range from 700 pounds a molten bath up. Gas, Oil, or Combination Gas-Oil Fire.

***WRITE TODAY FOR:***
***Specifications . . . Aluminum Heat Content Chart***
***Section View of Stroman "DC" Furnaces***

**STROMAN**

**FURNACE & ENGINEERING CO.**

Division of The Petersen Oven Co.
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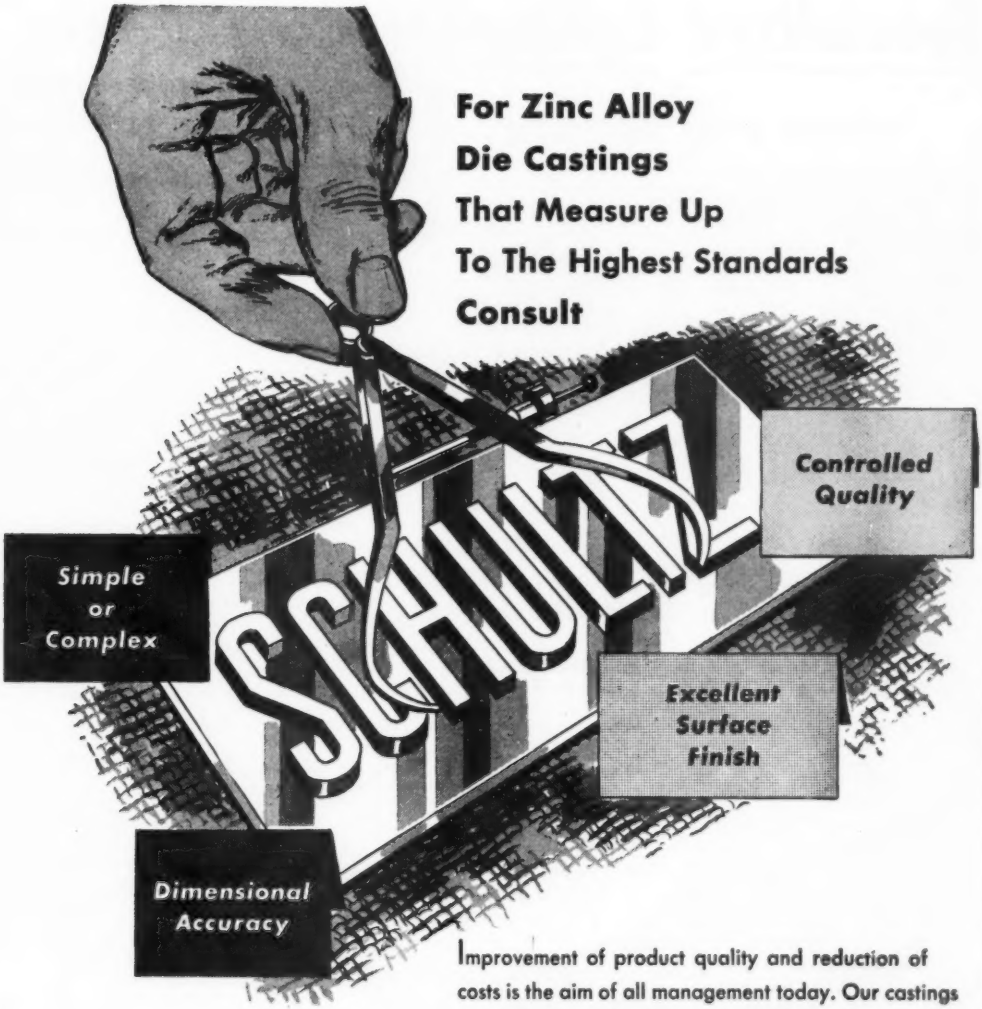


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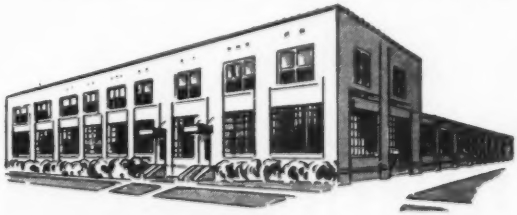
Improvement of product quality and reduction of costs is the aim of all management today. Our castings are both competitively priced and outstanding in quality, and can help you build a better product for less. May we quote on your requirements today?

**Our Engineers Are At Your Service**



**SCHULTZ DIE CASTING COMPANY**
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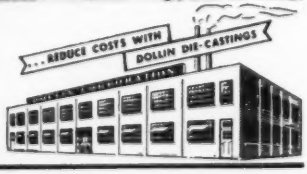


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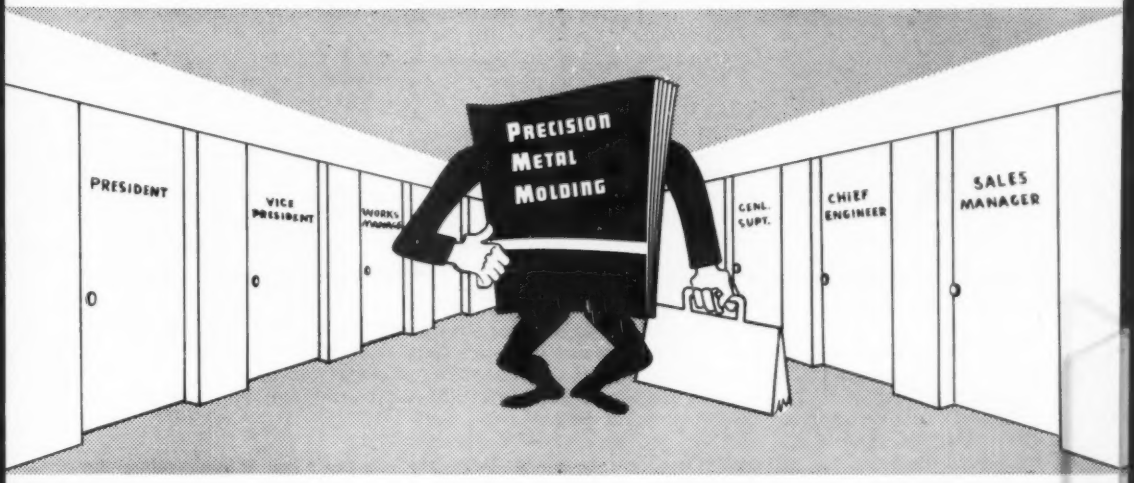


# Top Level Management Discusses...

# What's Ahead for DIE CASTING

**New Applications**
**Technical Advancement**
**Alloy Supply**
**Improved Finishes**

PRECISION METAL MOLDING has invited responsible executives in the Die Casting field to give you their views on what lies ahead for the users of die castings. They are conversant with the technical aspects of die casting, the metals situation, the finishing problems, and the trends in industry in general.

Each member of this Round Table has made an effort to present the situation as it appears from his point of view. Their opinions may be considered representative of the commercial die casting industry, even though their ideas vary on some aspects. In the following pages, they'll tell you about the trends in design, in metals, in finishes, in machines and dies, and in new applications . .

*Robert C. Strassman, Secretary-Treasurer, Badger Die Casting Corp.:* **"Die casting is tied to the craftsmanship of the die makers . . .**

The future of the die cast industry has only one limitation on it today, and that is the lack of material for dies and machine parts, which would be stable under repeated heat shocks. (The problem is under research by the industry.) Disregarding the search for the ultimate in perfection, the die cast industry is improving its quality and size of castings that are available every year. The price of die castings is declining every year in relation to other prices due to the hard work of many high calibre owner-operators in the business.

Die casting is tied to the craftsmanship of the die makers, and the bottleneck of the next ten years will be tools. Apprenticeships and proper inducements for men to come into the die making trade will continue after the ten years, unless buyers will offer and encourage higher tool prices."

---

*Edward S. Christiansen, President, The Christiansen Corp., Alumicast Corp., and Magnesium Corp. of America:* **"The advantages of die casting and the workability of magnesium spell out the reasons for the advancing tide of die cast magnesium applications in the automotive industry . . .**

The outlook for considerably increased use of magnesium die castings in the automotive industry is extremely bright. The automotive industry uses about half the total output of all kinds of die castings, and today is vigorously pursuing die-cast magnesium applications.

For example, the press recently reported that Chrysler Corporation has developed a new carburetor weighing only 1.8 pounds in magnesium. Further reports said Chrysler was working to replace 100 pounds of castings with 15 magnesium die castings—weighing only 25 pounds.

The inherent advantages of the die casting process linked to the workability of magnesium—as unlimited in potential availability as the sea water it comes from—spells out quite clearly the reasons for the advancing tide of die-cast magnesium applications in the automotive industry.

Magnesium die castings deserve the strong attention of the entire automotive industry because the increasing evidence of their use strongly supports the proven utility and acceptability of the product.

The big reason for any change is to produce economies without sacrificing quality of performance. Magnesium fast is growing into a major structural metal.

The use of magnesium results in many economies. Because magnesium is approximately one-fourth the weight of the heavy metals, more pieces per pound can be made. Machining magnesium produces an outstanding economy. Magnesium is the easiest of all metals to machine, this vital factor often dictating its use in parts where a large amount of machining is necessary.

Weight reductions through use of magnesium is an important advantage. Examples of applications are steering column assemblies and automatic transmissions, including such components as instrument panel brackets, steering column shrouds, valve bodies, clutch pistons, and housings.

Many painted decorative parts also are receiving considerable attention.

Magnesium is opening new applications for the die casting process. The outlook boils down to a long and healthy partnership."

# WHAT'S AHEAD FOR DIE CASTING

*Carl Roehri, President, Federal Die Casting Company:* **"Newer metals on the horizon may require new concepts of die casting processes . . .**

The question brings to my mind many things which are still in the embryo stage.

First, larger and stronger machines which can produce larger castings of various weights, machines which will automatically be serviced with metal, with other features and checking equipment to produce castings of high finish and soundness.

The lighter metals, aluminum and magnesium, are now firmly established and I look for new mechanical and chemical finishes to open many fields of commercial uses for these metals. Now, newer metals are on the horizon which may require new concepts of die casting processes. They will take their turn in taxing the ingenuity of men to overcome and solve problems which may be associated with their usage in die casting.

The industry has long been an art and is standing on the threshold of becoming a science, requiring new approaches and thoughts, mainly from the scientific side. The most important aspect to be emphasized is the development of our younger people to think for themselves while we guide them with experience and temperate judgment. We must urge self expression and freedom of thought with a minimum amount of controls. It is this younger generation with their engineering and scientific theory, coupled with our practical experience, who will apply known facts to our die casting problems, thereby forging our industry ahead to new heights of production miracles.

This is a far-sighted picture covering a period of growth and prestige for us all."

---

*Joseph Saks, Sales Manager, Products Dept., Gries Reproducer Corp.:* **"The still-young die casting industry has a great reservoir of untapped demand which can be released at progressively increased rate . . .**

Through personal experience in developing and encouraging industrial usage of tiny die castings, I feel that the usage of all die castings is still in the adolescent stage. A few years ago we offered to industry for the first time comparatively tiny die castings in a price range competitive with such processes as screw machine, stamping, cold heading, etc. We have since made great progress. Yet the surface of potential demand has apparently been barely scratched.

I believe, therefore, that the still-young die casting industry also has a great reservoir of untapped demand which can be released at a progressively increased rate through more aggressive salesmanship, educational promotion, and improved die casting techniques.

Such improved techniques should include increased mechanization and labor productivity, improved and wider choice of casting alloys, development of specialized die steels offering improved performance and wider choice for specific applications, and reduction in the labor cost factor in aluminum die casting.

continued next page

Rising labor and operating costs are causing industrial management to make greater efforts towards all possible cost reductions. Also, there is concern over current and possible future shortages of raw materials. Die casting offers manifold opportunities for solution of these problems because of: (a) more plentiful supply of major die casting metals; (b) high productivity rate and cost-reducing design flexibility inherent in die casting; (c) no need for pre-fabricated raw materials; (d) lack of scrap generation.

After some thought, I find that I cannot honestly suggest any fields of manufacture offering the greatest potential applications for die castings. Who can say that one or more of the automotive, electronic, atomic, electrical, building construction, aircraft, air conditioning or home furnishings and appliance fields offers the greatest application for die castings? Because die casting is the ultimate casting method, I believe that all industry offers a tremendously increased market."

---

*Ernest W. Brix, Die Casting Superintendent, Hampden Brass & Aluminum Co.:* **"The aluminum outlook is bright, and zinc is showing a tendency to climb back to the position it occupied before material shortages . . .**

Material shortages may have slowed down the production of die castings, but they have not lessened the trend toward die casting as the means for quality and quantity production.

Automotive equipment, hand and electric power tools, instrument cases and housings, household appliances, typewriters, and, of course, the multiplicity of ordnance parts are using more die castings than ever in their designs. Allotments for material are being applied to die castings to the maximum allowed by regulations.

With material shortages and high material costs, it becomes necessary to decrease ultimate costs for assemblies and operations. Die casting offers a saving in assemblies by combining two or more parts in one casting. The casting of integral lugs and bosses saves staking and welding operations. Lightening of sections saves valuable material; gives more pieces per pound. Holes of odd shapes can be cored without machining. Centers for holes can be held within commercial limits.

The present outlook for aluminum appears bright as production has increased. Zinc production has been showing a tendency to climb back up to the position occupied before material shortages. The weight—cost factor has brought aluminum to the fore during this era of shortages and high prices. Higher production rates with lower reject rates makes zinc competitive as castings get smaller.

Yes, die castings are here to stay. Whether at home, in the office, or away, we are reminded of the utility and beauty in the ever-increasing application of die castings in modern design."

---

*C. L. Anthony, Executive Assistant, The Hoover Company, Die Casting Division:* **"As labor rates continue to increase, more money will be invested in tooling and equipment to reduce that part of production costs . . .**

The future of the die casting industry should show a progressive expansion—that is if the planning for The Hoover Company Die Casting Division can be used as a criterion for other companies in the field. The Hoover Company is looking forward to materially increasing their die casting facilities as the foreseeable future indicates will be necessary. Metal controls and partial industrial

mobilization have necessitated rearranging the timing of this expansion to some extent; however, definite optimism prevails for substantial increases in business volume for the Division for the five major reasons listed below:

1. Companies in the mass production field competing for the consumer's dollar must continue to cut labor costs. As labor rates continue to increase, more money will be invested in tooling and equipment to reduce that part of production costs. Close tolerance die casting will be one of their more important considerations.

2. There will be a return to die castings where other processes have been used due to the better availability of material for those processes.

3. Large expansion of the industry will be necessary due to engineering acceptance of the die casting process for critical functional parts never before thought applicable to die casting. In the last three years, testing programs have shown an overwhelming acceptance of die casting in this field where previously die casting was considered by many designers to be used for ornamental purposes only.

4. Industry, during this defense period, has again shown an increase in the use of magnesium die castinngs. We believe it unnecessary for magnesium to lose its gain at the end of this defense period. However, in order to maintain this gain, magnesium metal must be produced in low cost plants and the price must be allowed to seek an economic level rather than be maintained at a point in direct relation to aluminum, according to its specific gravity.

5. Possibly the most important factor in the planned expansion of facilities is the accelerated demand for goods and the increased income due to the current trend of our national economy.

These factors, combined with the knowledge that the die casting process is no longer a secret known only to a few but is now a process known to thousands of students, engineers and business men all over the world, have convinced us that the die casting industry is now on very sound ground and there is every reason to believe that we will witness additional development in the future."

---

*R. C. Cornell, Vice President, Litemetal Dicast, Inc.:* **"As die casters learn to produce plating-quality magnesium and aluminum die castings, their use in automotive hardware will become extensive . . .**

To put a finger on the outstandng developments in die casting in a year's period is difficult. Such developments and accomplishments do not sprout like mushrooms. They evolve gradually over the years.

Several years ago the use of super-high pressures in casting machines were hailed as cure-alls. They have, without a doubt, proved to have a place in the production of some types of castings but to be completely inadequate for other types. The competent die casting engineer has come to realize that wide flexibility in a die casting machine is more important than extreme characteristics in any one direction. It has also been shown that a scientific approach to gating has done much to improve casting quality.

When plating was introduced for the finishing of zinc die castings, the die casters were forced to drastically raise their quality standards and to thereby virtually re-develop their art. The same

continued next page

has proven to be true in promoting the plating of the light metals. An excellent example of this is the absolutely perfect surface finish required on the five aluminum die castings for a chromium plated salad cutter. These castings are produced by Litemetal Dicast, Inc. and are plated by Imperial Plating and Metal Finishers, Inc. of Waterloo, Indiana. Limited quantities of these parts have also been produced of chrome plated magnesium.

As more die casters learn the techniques of producing plating-quality die castings in magnesium and aluminum, their inevitable use in automotive hardware will become extensive. The basic drive for this end is the relative material cost of the light metals as compared with zinc. For example, consider a one pound aluminum casting. It will contain, including melt loss, about $.225 worth of metal. The same part would contain $.245 worth of magnesium. By contrast, it would require $.50 worth of zinc. The incentive for plating the light metals is thus apparent. It is probable that the extensive use of plated aluminum will precede that of magnesium. The main reason for this is the relative difficulty of producing magnesium die castings with adequate freedom from surface cracks and flow lines."

---

*Gustav Nyselius, President, Mount Vernon Die Casting Corp.*: **"The problem of die steel has come to its solution . . .**

Our greatest accomplishment in the last years has been our expanse in the field of aluminum casting, making us nearly independent of zinc. We firmly believe that the future of the die casting business belongs to aluminum and since price is the determining factor in selecting the use of die casting, the price and availability of aluminum is substituting the use of zinc as a MAJOR factor in the die casting industry. If our national economy keeps on expanding, we will probably find zinc in short supply and aluminum in abundance.

For the industry as a whole, the automobile offers probably the biggest chance for growth but in the East we are relying on appliances. A die casting factory must have its roots in many different manufacturing branches and it must be diversified. The biggest need for improvement is in the field of electric furnaces and heat control instruments to prevent dross formation and assure the right temperature for a given job.

We believe that the problem of die steel has come close to its solution. We are at present operating an aluminum die that has about completed five years of continuous service and produced over one million three hundred thousand castings of approximately six inch diameter and weighing ten ounces. This with the gate makes about six hundred fifty tons of aluminum and we believe, with all other factors included, that is a satisfactory record. The best indication of continued and increased prosperity of the die casting business rests on the complete absence of a better and cheaper method of producing accurate, machinable and stable parts for anything where aluminum and zinc are used."

# WHAT'S AHEAD FOR DIE CASTING

*W. J. During, Executive Vice President, Precision Castings Co., Inc.:* **"The outstanding job done by the commercial die casting industry during World War II has expanded both applicataions and confidence in die casting . . .**

Undoubtedly, the perfection of the rugged torque converter parts for automobiles represents one of the outstanding developments of the past few years as this is the first time so significant an application has been filled by die castings in secondary alloy, so controlled as to be sufficiently uniform that failures are infinitesimal.

The automotive field remains the leader in the application of die castings, closely followed however, by washing machines and other household and business machine items.

The materials supply situation is improving rapidly to the end that another year will see ample for all uses. This, accompanied by the easing of price in the zinc market, will permit the return to more rugged trim parts instead of the fragile thin steel substitutes now in use.

The future technological developments are still in their infancy insofar as the development of new and larger die castings is concerned.

The outstanding job done by the commercial die casting industry as a whole in World War II has expanded both the applications and confidence in die castings, to the end that the present uses should double again in the next five years."

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*R. T. Lewis, Sales Manager, Light Metals Division, Thompson Products, Inc.:* **"In the search for better, cheaper ways to make parts we have not, as yet, found a better method than the high pressure casting process . . .**

In my opinion the future of the die casting industry is exceptionally bright, offering a challenge to those who will accept it. In the search for better, cheaper ways to make parts we have not, as yet, found a better method than the high pressure casting process. True, much work remains to improve our dies and machines, but that improvement will come with time. The industry should be evermindful of the fact that die castings are not, as yet, the answer to all casting problems and in some cases the die casters must make that final decision. By ingenious thinking and good engineering, many parts thought impossible can be fabricated. Better design for stresses can be accomplished as well as the employment of mechanical devices for increasing productivity.

Improvement and development of alloys and die steels will come with time and the possibility of casting the high temperature ferrous alloys will be a future possibility.

Improvements in finishes and plating will be made and high pressure castings will be used for many applications and in many industries now thought impossible. Let's sell right, design right and manufacture and think right for future progress and the high pressure die casting industry will enjoy healthy growth.

It should not be overlooked that the greatest progress is gained by the exchange of ideas and knowledge and if the industry will cooperate, progress will be faster. PRECISION METAL MOLDING is one medium through which we all can speak, editorially and with our paid advertising—Let's Go—

*H. H. Weiss, President, Superior Die Casting Company:* **"The die casting industry must press forward with its efforts of utilizing higher melting-higher physical propertied metals.**

Die casting (raw material to finished part) technique is the most efficient metal fabricating method. In addition to the progress made in the field of zinc and aluminum base alloy die castings, the industry will find further growth with the use of higher melting — higher physical propertied metals. The industry must press forward with its efforts of utilizing such metals.

It must seek improved methods to accomplish this and to maintain its material leadership in the field of off-setting increasing labor hour costs thru greater productivity.

The problems inherent in these tasks are technological, which must be the constant guide posts and spur to greater research efforts.

Many of these problems are of great magnitude, but in a planned long range attack upon them lies the industry's best assurance of continued growth."

---

*Harry Costello, Works Manager, Advance Pressure Castings, Inc.:* **"Faster, larger, more powerful die casting machines will make possible an ever increasing market for larger, more intricate castings.**

The future is very bright. This is due mainly to new products which are constantly being designed, old ones being redesigned for economy and styling, new techniques and new fields.

One new field that immediately comes to my mind is electronics. The die casting industry is building junction boxes, housings and chassis for electronic devices by the hundreds of thousands at fabulous savings to their customers. At Advance we are now making a set of chassis that weigh over ten pounds each in aluminum. We are able to cast bosses, holes and ribs that could not be cast before and we are eliminating numerous other fabricating operations whch saves our customer $20.00 per casting over his previous method of fabrication. This is one example why the die casting industry will continue to expand.

In addition to the above I believe that as the more modern die casting machines which are faster, larger, and more powerful are introduced there will be an ever-increasing market for larger and more intricate castings such as referred to above. It is my opinion that the size of die castings is only limited by the size of the castings machines being built, and some of the best machine builders in the country are now interested in this situation and are building very large machines.

On the metallurgical side of the picture, I feel that as soon as the material situation gets back to normal the use of magnesium for die castings will rise sharply and eventually will take its place as one of the primary die casting materials along with zinc and aluminum, thereby bringing additional advantages in light weight and strength.

The shortage of zinc and the comparative high cost coming in critical periods has been responsible for many engineers turning to aluminum for certain production, and many of them have found advantages in aluminum which they were not cognizant of before and are reluctant to return to the use of zinc. As the efficiency in applying plated and other finishes on aluminum increases I believe some of the largest users of die castings such as the automobile and appliance manufacturers will use more aluminum die castings for trim and accessories. In addition they are now finding that more and more parts that were formerly made of other materials for reasons such as pressure tightness, resistance to corrosion, high strength, and ductility, can now be made successfully as zinc die castings.

Taking all these facts into consideration I would say there is plenty of room for expansion in the die casting industry and we will take advantage of it as rapidly as possible."

**LONGER WEARING** than hobbed iron molds, these rubber eraser molds are produced by powder metallurgy.

# Molds for rubber by POWDER METALLURGY

RUBBER erasers for pencils are formed in metal molds; the conventional methods of producing these molds have been either automatic screw machine where shapes are suitable, or hobbing in a soft iron.

At the Joseph Dixon Crucible Company of Jersey City, N. J., a new method of producing eraser molds has been used successfully. This company, which is not only a major producer of lead pencils but also a contract fabricator of powdered metal parts, has been making its own eraser molds by powder metallurgy.

Eraser molds, such as those shown above, are used in large volume. The rubber in erasers has a high abrasive content which results in relatively short die life.

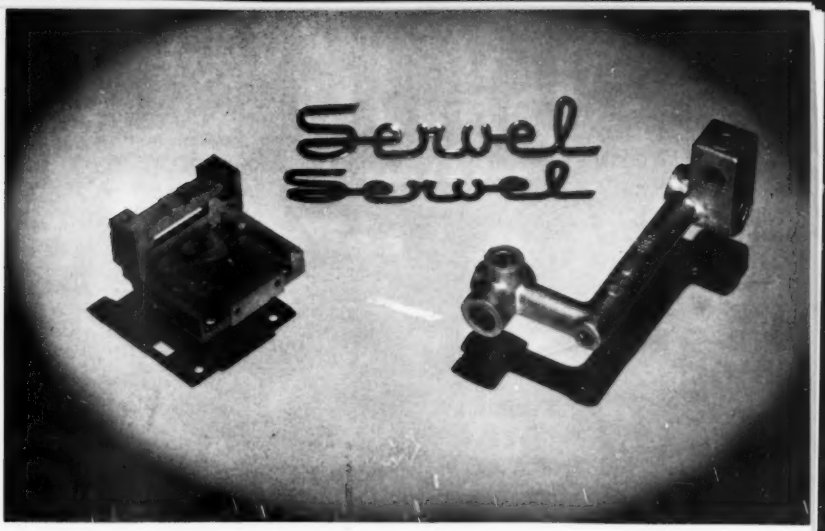
Not only has it proved to be less expensive to form these molds by powder metallurgy, but the actual mold life has been many times that of the hobbed molds. Where the shapes can be cut on screw machine, this is still a less expensive method to use. As can be seen from the examples above, many erasers have shapes which cannot be sunk into a mold by screw machine. These are better and cheaper when formed by pressing and sintering.

The molds are pressed from an alloy steel of eutectoid carbon content. These molds have much longer service life than those formed in soft hobbing steel. Credit for longer die life is probably due to the high particle hardness.

The slight wearing of the mating edges of the upper and lower cavities in molding an eraser cannot be tolerated. After molding, the erasers are tumbled in a barrel to remove flash, and when the edges of the mold become worn, the flash is too heavy for rapid removal.

For the same reason, accuracy of the cavities is important so that they mate perfectly during molding. The close uniformity of the molded metal powder parts meets the requirements. These edges are held within .001 around the outside.

In addition to the abrasive action of the pumice in the rubber erasers, the molds are subjected to a certain amount of heat, since the erasers are vulcanized while they are being molded. The inherent porosity of the molds produced by powder metallurgy allows the escape of gases, but the surface is smooth enough to form a smooth product.




# What the purchasing agent should know about buying DIE CASTINGS

By F. G. KRACH*

PROGRESS from the horse and buggy to the automobile to the airplane has been possible largely through the development of new materials of construction. Without today's wide range of metals and alloys, many of our modern "necessities" would be impossible.

Paralleling this progression has been an increased load and responsibility on the purchasing agent. It is, indeed, a far cry from a piece of straight grained, second growth ash to a complex fully finished die casting, but, unfortunately, many purchasing agents still think that they are purchasing single trees or ax helves.

Because of the high degree of specialization that exists today, it is quite common for purchasing agents, particularly in larger organizations, to limit their activity to rather narrowly defined fields. Even when this is the case, the buyer who must purchase die castings needs to have some specialized knowledge over and above that required to purchase intelligently materials in the general class of castings and forgings.

A fairly intimate knowledge of what a die casting is and what sort of properties can be expected of it is absolutely essential. In spite of the best engineering brains available, there are many cases when a sand casting, forging or extrusion is specified where a die casting would do the job as well and at a lower cost. There are also those cases where a die casting is specified in an improper application and the purchasing agent should be able to spot these cases and suggest correction to the engineering and development departments.

The machine operations on, and the surface finish that is to be applied to, a die casting must be part of the specifications as they come to the purchasing agent. With this information, he will then be able to select those foundries who are able to perform some or all of the secondary machining operations and the fin-

*Assistant purchasing agent, Servel, Inc.

**THREE CATEGORIES of die castings bought by Servel are illustrated, left. They are, from left to right, a mechanical, functioning part; a decorative trim casting; and a pressure-tight component. Each has its own set of purchasing requirements.**

ishing operations. This is an essential ability since it is often far less costly to have the foundry perform these operations than it is to do them in the plant.

Broadly speaking, die castings can be divided into three classes: Trim (decorative) castings; mechanical castings; and pressure (or vacuum) castings The purchasing agent must know first in which of these three classes the part to be bought falls and secondly, which foundries have the specialized knowledge and ability to produce them. While almost any foundry can produce good trim casting with, if necessary, a hardware finish, not all of them have the know-how to cast either mechanical or pressure castings.

## Buys Finished or Semi-Finished Castings

There are many cases where the secondary machining operations that are to be done on a die casting involve the use of highly specialized machines. Generally, those machines are not immediately available and might have to be purchased. A good purchasing agent will generally know where such machines are located in die casting foundries and will place his work there in order to save his company the cost of the special machine.

The level of work in the shop is also a part of the purchasing agent's specialized knowledge. When sand castings and forgings are purchased, the vendor supplies them in the as-cast condition with only the gates and risers cut off. The buyer, therefore, expects to do all of the finish machining on such products. In the case of die castings, however, many foundries have very large and complete machine shops and if the work load is heavy in his own shop, the purchasing agent will try to place orders in those shops that can semi-machine or fully-machine the castings. This same applies to surface finishing. If, however, the work load is low, the purchasing agent can then go to those foundries that do not have the machine shop facilities available and figure on doing the secondary operations in his own shop to keep machines in operation.

To better understand the steps involved in the proper purchase of die castings, it will be well to follow through a typical case at Servel Inc., starting with the inception of the part in, let us say, the engineering or development departments.

When a new part is in the design stages, there will generally be more than one method of manufacture that can be used. From an operational point of view, it may be just as well to use a forging, a sand casting or a die casting. However, depending upon the method employed in making the piece, there may be slight differences in the final design. While it is the duty of the engineering department to design a part that functions properly, certain liberties may be taken with this design and it is here that the purchasing agent first steps into the picture. From his experience, he knows that certain types of parts can be made satisfactorily and economically by die casting in either zinc or aluminum.

At this stage, with the cooperation and understanding of the Engineering Division, the purchasing agent may call in engineers from the foundries to confer with engineers on finalizing an experimental design. Those changes are made which will enable the die caster to produce a better part at a lower cost than he could otherwise, if given a fixed design and asked to bid. At this same stage in the development, the purchasing department determines those secondary operations that will have to be done on the casting, the final finish that is to be given the part, and the alloy preference if any.

Equipped now with a set of experimental drawings, the secondary operations to be done, the finish to be given and the alloy to be used,

continued next page

## The Author

F. G. Krach has been with Servel for more than 20 years, the last 16 in the purchasing department. He is now assistant purchasing agent for the company. Before joining Servel, he was in the automotive industry for four years.

Born and educated in Evansville, he has been active in civic affairs and is an ardent sports enthusiast. He is a member of several local organizations including K. of C., and Turners.

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the purchasing agent is in position to ask either for bids or if still necessary, determine what method of manufacture is to be used. In this latter case, drawings and requests for bids will be sent out and, when replies are received, the economics of manufacturing determined. Not only is the first cost determined, but the cost estimated for each different fabricating method with the part ready for installation in a unit or cabinet whichever the case might be.

Once having determined that die casting is to be used, the purchasing agent working with the engineering department secures the finalized drawings and then proceeds to secure final bids.

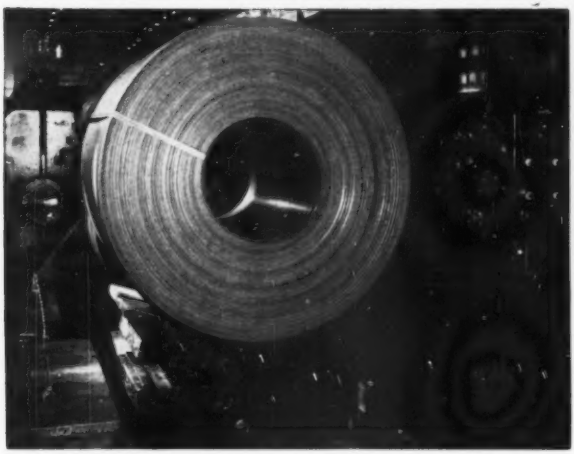
Assuming, as we have, that the part to be made is a pressure part, the purchasing agent will select only a small group of companies to receive bid requests. These companies will be those who have more or less specialized in this type of product. There are, however, other considerations which must be weighed before requesting bids.

- The die casting company must have an adequate financial rating so that they will be able to handle the business if it is given to them.
- The foundry must be located so that, when necessary, any interchange of ideas and consultation can be carried on without undue traveling by any inerested parties.
- The foundry should be located in a stable labor market to insure against work interruptions.
- The history of the labor relations within the foundry company must be such that the possibility of work haltage due to strikes is relatively remote.
- The foundry must be able to give adequate service to Servel. This includes not only delivery as required, adequate tool facilities, but also the use of technical personnel to develop the best casting design that will do the job.
- The type of customers of the foundry are considered; that is, are they accustomed to dealing with purchasers who take very large volumes of parts, or are they primarily a short run shop.
- The facilities at the foundry to do secondary operations, if required which may include a wide variety of machining operations, tumbling, buffing, polishing, plating, etc., are of major importance.

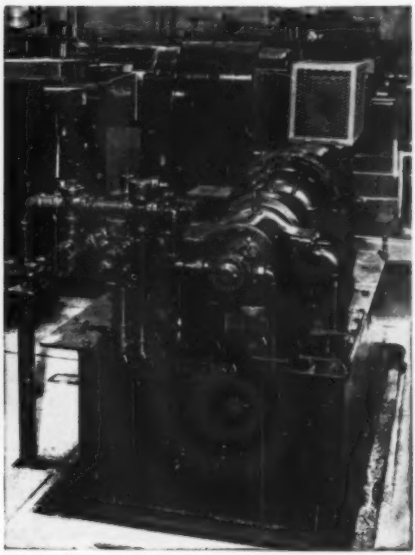
Obviously, not all foundries competent to make a pressure tight casting are equipped to do a wide variety of finishing operations. It is generally the custom, then, to request bids

continued on page 80

# —At UNITED STATES STEEL—



Coil cradle on United States Steel Company's Irvin Works Three-Stand Cold Reduction Mill. Marvel Synclinal Filters are a part of the mill's main hydraulic system which operates this cradle as well as other hydraulic machines.



Hydraulic pump and tank on the recoiler hydraulic system of United States Steel Company's Gary Sheet and Tin Mill's Continuous Galvanizing Line. A Marvel Synclinal Filter is installed inside the tank on the suction line.

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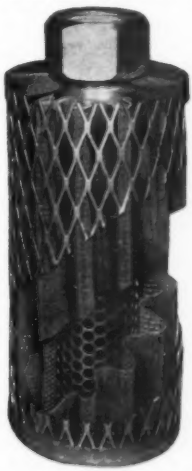

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LINE TYPE (Cutaway)

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# INVESTMENT CAST gears and cams in custom-built machines

WHERE do the precision molding processes fit into the manufacture of custom-built machines?

It is the common notion that where limited quantities of precise parts are required, as in the construction of special machinery, only the conventional machine shop method can be used economically. Nothing could be further from the truth.

As an example, the special machines built by Alfred Hofmann & Company of West New York, N. J., for the manufacture of incandescent and radio tubes, make extensive use of investment castings, both ferrous and nonferrous.

In every case, lower costs have resulted where investment castings have replaced gears, cams and special shapes machined from the solid or fabricated from two or more individually formed components.

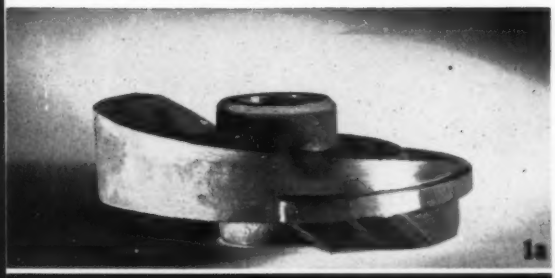
Quantities? Even in years when the radio and television tube industry is operating at peak loads—which is not currently the case because of materials shortages—the number of tube making machines produced each year must be numbered in the hundreds. This does not appear to be large enough volume to justify use of a precision casting technique.

There has always been the erroneous concept among designers that the lower piece cost of the precision molding processes would be more than eaten up by higher tooling costs.

The fact of the matter is that this company finds it less expensive to use investment casting, even though some pieces are used in quantities as small as two per machine, while the average number of identical pieces in any machine is 24.

While such precision processes as die casting and powder metallurgy do require a relatively high tool investment, thus limiting themselves to the high-volume applications to amortize tool costs, investment castings require only moderate tooling expenditure and often result in the elimination of 50 to 75 percent of the machining, fitting, finishing and assembling which run piece costs high on machined components.

Despite the highly specialized nature of their production, dozens of different investment castings go into each tube machine. A few typical ones are presented here because they suggest a range of parts which other designers of special machines may find applicable to their own projects.



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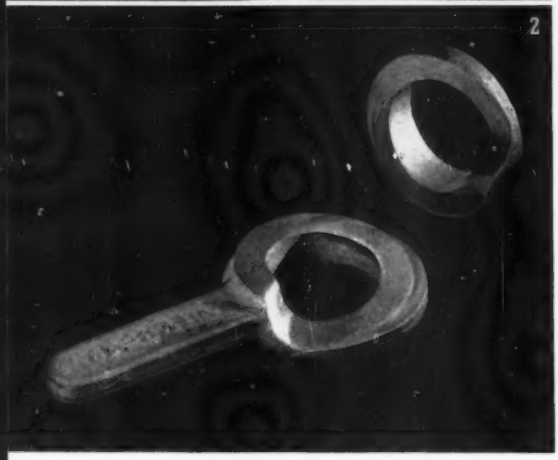

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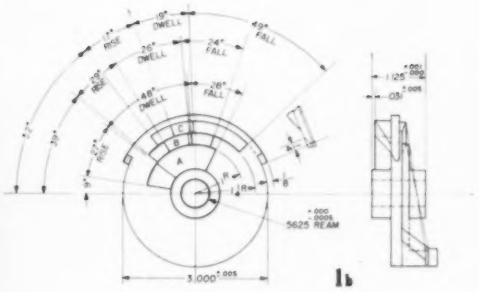


1b

". . . No attempt is made to hold excessively close tolerances. Investment casting is thought of as a means of getting close-to-dimension blanks. Where tolerance of +.001 —.000 is required, both surfaces are finished."

CYCLING OF OPERATIONS is a feature which most special machines have in common, and these are usually controlled by some cam arrangement. Single or multiple cams are commonly investment cast for these Hofmann tube machines. Three typical examples are illustrated.

Figures la and lb show an "inserting head" cam used on a machine for inserting filament support wires into glass stems. This complex piece has one cam on its top surface, three on its underside, and one on its circumference. The amount of time, labor and tooling necessary to profile this from the solid is apparent.

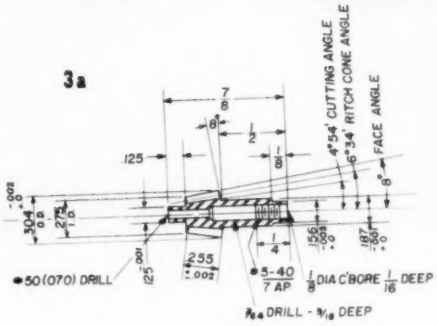
Figure 2 shows a pair of mating cams used in a 24-head automatic exhaust for evacuating air from the tubes and lamps. These comparatively simple cams ride against each other; each has some secondary conformation which increases the work needed to manufacture it from the solid. One has a special lever extension and the other has a pin from its flat surface. All three cams illustrated are cast in steel.

No attempt is made to hold excessively close tolerances. The investment casting process is thought of as a means of getting a close- to-dimension blank, but is not regarded as a means of evading close-tolerance finishing operations. Here it eliminates some slow and costly profiling, saves metal and assembling operations.

Notice on the drawing, Figure lb, that a tolerance of +.001 -.000 is required between the upper and lower face of the central boss. These surfaces are both machined. All cam surfaces are polished. The center hole is cored, but the close size + .000 - .005 is reamed. Normal cast tolerances are ± .005.

continued next page

". . . Tooth forms and accuracy are not as precise as is possible by machining, but are usually entirely satisfactory for the majority of machine functions."




CAST GEAR TEETH are another attractive accomplishment by the investment casting process worth study by designers of special-purpose machinery. Tooth forms and accuracy are not as precise as is possible by machining, but are usually entirely satisfactory for the majority of machine functions.

Two examples of different types of gears which the Alfred Hofmann Company produces by investment casting are offered in Figure 3. Of these, the larger, segment gear is cast in bronze and the small pinion in steel.

The segment gear casting, with a 42 degree segment, measures about 2½ inches in its longest dimension. Only two dimensions are held exceptionally close, and these relate to distances from the centers of two holes. Both holes are cored and then reamed to finish size. The only other secondary processing on this gear is the sanding of several surfaces. The 24 pitch gear teeth are .090 deep.

The pinion, drawing for which is shown in Figure 3a, is considerably more complicated. This appears to be a typical automatic screw machine part, and in view of the number of drilling, counterboring and tapping operations needing to be performed on the investment cast unit, it would seem to favor screw machine fabrication. Nevertheless, the actual cost analysis of this loop-forming pinion used in an "inserting machine" shows much lower cost by investment casting.

Here, even though every surface except the gear teeth needs finishing operations, and there are four internal machining operations, the savings by investment casting are almost 25 percent. This is mainly due to the setup which would be called for on a screw machine, and since only 20 are needed per unit, the tool costs for screw machine would boost the piece costs too high.

Another type of common investment cast component is included in Figure 3. This is a fork for holding a roller in the inserting machine. This part could easily be cut from bar stock with a series of straight cuts and the drilling of three holes, but since only two are used on each machine, investment casting has proved to be cheaper. Setup time, alone, to produce this small a quantity by conventional machining, would be prohibitive.

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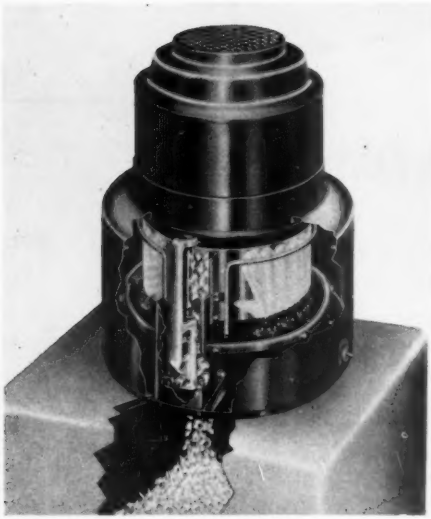
# HOW PLASTER



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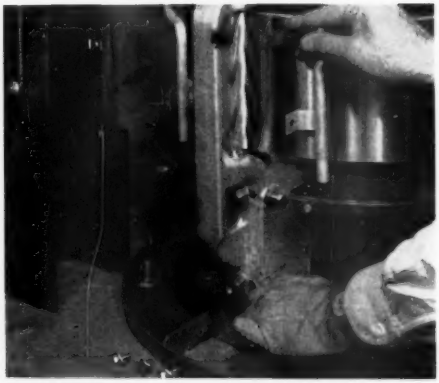

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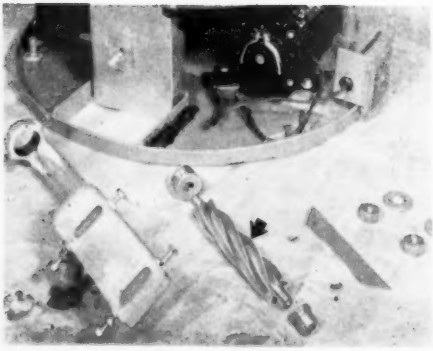


3.

THE cutting tool of York Corporations's new automatic ice maker, Figure 1, is an outstanding example of the application of the plaster mold process in the design and economical production of non-ferrous castings with uniformly high physical values, dimensions within ordinary machine tolerances, and surfaces requiring little or no machining.

Design specifications laid down for this critical component called for a trouble-free cutter capable of turning out fragments of ice so delicate they would not bruise or puncture fish, poultry or even rose petals when the ice was used in bulk.

As designed and cast by the plaster mold process, the ice cutter promises to be virtually a

---

**CUTTING BLADES THAT SPIRAL 200 degrees in 6 inches were required for the York Corp.'s new automatic ice maker, Figures 1 and 2. The difficulty and expense of forming and welding these units has been eliminated by means of the cutting tool indicated in Figure 3, produced by plaster mold casting. Atlantic Casting & Engineering Co. make these castings for York.**

# MOLD CASTINGS can solve unusual problems: Part 1 - Design

**. . . a review of some outstanding applications, castable alloys, physical properties, methods of casting and and process advantages.**

life-time part of the ingenious new machine.

The ice cutter, Figure 2, has six blades on a center shaft, all cast in one piece of manganese bronze and tin dipped. It is mounted vertically inside the ice chute in a galvanized iron support, with an upper bearing of self-lubricating porous bronze and a needle and bushing bearing at the bottom. The support for the cutter, which measures 7 5/8 inches from tip to tip, has four adjusting screws and locknuts to set and lock it for proper ice cutting clearance.

## One piece construction via plaster mold

The plaster mold process solved a major problem posed by the first design approach to the ice cutter. It specified ⅛ inch stainless steel blades with blades twisted to 216 degrees in six inches and welded before finishing. The blade ends were to be machined to fit the plug ends of the shaft and then arc welded to the top and bottom stainless steel end shafts.

By evolving a one-piece cutter, Figure 3, the plaster mold process engineers provided greater strength in the part and, of course, eliminated time-consuming welding and finishing operations. Blades of the new cutter spiral 200 degrees over their six-inch length and are spaced 60 degrees apart. To obtain required strength, a manganese bronze with the following alloy and physical specifications was used; copper, 65%; zinc, 23%; aluminum, 5%; iron, 2.5%; and manganese, 5%; ultimate tensile, 100,00; yield point, 60,000; elongation % in 2 inches 7.0; Brinell, 190.

The process used to produce the York ice cutter is the modern mechanization of all the hand molding processes and offers low cost, plus accuracy and uniformity of castings, improved strength, better appearance, greater freedom in design, and a reduction in the number of pieces required because of a lower percentage of scrap. It permits the very close control necessary for cost reductions and accurate, sound pieces.

Basically, the process of pouring wet plaster over machined brass die patterns is like many others used for centuries. The significant difference is that, through mechanization, it is done on a mass production basis at an attractive cost and still offers the flexibility that hand molding provides for the small user.

Two recent castings point up the design simplication attainable in plaster mold castings. One eliminated a three-unit link for a Westinghouse Electric oil circuit breaker. The company's rough blue print specified a link composed of three separate units, Figure 4, which had to be welded together and machined. It was redesigned as a one-piece casting from high tensile manganese bronze, a dependable engineering material that is stronger than many steels. As plaster mold cast the link required no machining or fabricating. Welded construction costs about 200 percent more than the plaster mold casting.

## Castings pass fatigue and vibration tests

The Small Motors Division of General Electric also turned to the plaster mold process in its search for a light-weight, rugged brush holder for use with military aircraft generators. The original design, Figure 5, which would have resulted in welding and machining operations, was modified to permit the brush holder to be cast in one piece and to be used after one surface was faced and a hole drilled and

continued next page

**4. EXCEPTIONAL SAVINGS resulted when the welded assembly, left, was superceded by the one-piece plaster mold casting in manganese bronze, shown at the right. Photo courtesy Atlantic Casting & Engineering Co.**

tapped. Subsequent vibration and fatigue tests did not produce a failure and the accepted precision casting provided more than ample strength, and close tolerances and reduced cost desired by both GE and Wright Field.

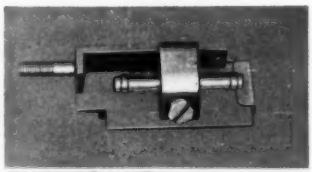
Freedom of design is one of many advantages inherent in the plaster mold casting process. The standard molding flask produces an 11.5 inch x 17.5 inch mold with an over-all depth of 3.5 inches for combined top and bottom halves. Variety in depth of parts is dependent on the location of the parting line and on the maintenance of a reasonable margin of plaster over the die pattern. Symmetrical parts up to 3 inches deep are feasible. Maximum depth from one side of the parting line is limited to slightly over 2 inches in non-symmetrical parts. Variations from these dimensions are possible in some cases.

However, there is nothing inherent in the process that limits the size of the castings that can be produced and, if the volume warrants it, large non-standard molds can be provided.

The standard plaster molds are made in cope and drag sections. Because molds and cores are made of plaster that is practically inert and thoroughly dried, no gases are formed and, consequently, there is no ebullition of liquid metal when it flows into place.

No artificial venting is necessary, since the mold is self-venting. Slow cooling and the yielding character of the mold material permits the casting to contract to an almost stress-free state. Hard spots, sand-inclusions and blow holes are eliminated. The uniformly high physical values are a direct result of the control used to make them uniform and are a function of the cooling cycle which, in certain copper base alloys, provides a finer grain structure than where a sand or chilled mold is used. These features combine to supply castings free of hidden defects. They reduce costs by eliminating scrap.

**5. REDESIGN OF A BRUSH HOLDER to be produced by plaster mold casting has improved the unit's service life and cut costs. Plaster mold casting, below, is produced by Atlantic Casting & Engineering Co. Assembled brush holder is shown at top.**



The process offers an elasticity in producing castings that is often impossible and alyays comparatively expensive by other means. For example, no particular problems are encountered in producing castings having thin walls, blind gear or internal ratchet teeth, stops, tapering sections or inserts. It makes possible transverse passages of varying cross-sectional areas even where the cross-sectional area in the interior of the casting is larger than the cross-sectional area at the exterior. Transverse holes and passages are handled through the use of loose plaster

**continued on page 62**

PMM

# Finishing Section

## SURFACE FINISHING

Most precision metal molded parts receive some type of surface finish such as plating, organic coating, anodic coating or chemical coating. This section includes information on the methods, processes and equipment used in these surface treatments.

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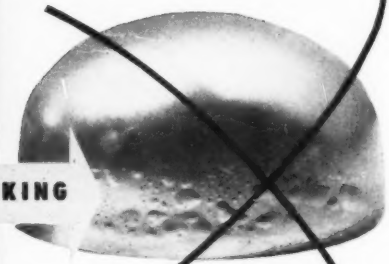

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# A practical plating cycle without nickel for ZINC DIE CASTINGS

By WILLIAM BLUESTONE*

SHORTAGES of certain materials brought about by the rearmament program have, in some cases, forced substitutions that will become permanent, while in other cases, as soon as the restrictions are lifted, the industry affected will probably return to the method temporarily dropped.

The manufacturers of bathroom and kitchen fixtures have had a double-barrelled dose of substitution. Brass, their basic material of construction, is in short supply and nickel, the basis of all of their corrosion resistant finishes, is unobtainable.

As far as the shortage of brass is concerned, the manufacturers turned to zinc die castings and have found that in many, if not all, cases there will be no advantage to going back to brass when it is available. In fact, from some points of view, die castings are preferred.

The problem of plating either brass or die castings is, however, quite a different story. In recent years, the public has become accustomed to a chromium finish and the idea has grown up that this plated finish is superior in corrosion resistance to the older nickel plated finish. The chromium does give some added protection, but its principal advantage is in eye appeal since it stays brighter longer than nickel.

The plating of die castings does not present

*Blue Jay Chrome Products, Inc., Pittsburgh, Pa.

TABLE 1

| SEQUENCE OF OPERATIONS | | |
|---|---|---|
| **Brass with Nickel intermediate coat** | **Zinc die casting with nickel intermediate coat** | **Zinc die casting with no intermediate coat** |
| 1. Buff<br>2. Bright Copper, 2 min.<br>3. Nickel, 7-8 min.<br>4. Chromium, 45 sec. | 1. Buff<br>2. Degrease<br>3. Color<br>4. Alkali soak and reverse current clean<br>5. Dull copper, 1 min.<br>6. Bright copper, 7 min.<br>7. Nickel, 7-8 min.<br>8. Chromium, 45 sec. | 1. Buff<br>2. Degrease<br>3. Color<br>4. Alkali soak and reverse current clean<br>5. Dull copper, 20 min.<br>6. Buff<br>7. Clean<br>8. Chromium, 2 min. |
| **BATHS** | | |
| **Copper** | **Nickel** | **Chromium** |
| Cyanide bath<br>pH 12.9<br>140°F | Chloride bath<br>pH 2.9<br>138°F | Chromic acid bath<br>No pH control<br>122°F<br>$Cr_2O_3$ controlled |
| Chromic acid poisons bath—can be removed and bath re-used. | Cu, Zn, Fe poison bath—can be treated to remove impurities. | Bath slowly breaks down—must be dumped when no longer usable. |

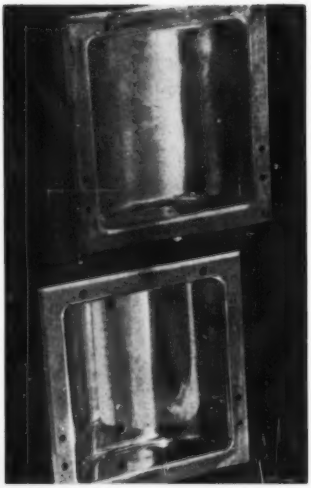
any particular problem. In general, a zinc base die casting, can be handled in much the same manner as a brass part, but when the intermediate coating of nickel is removed, then trouble is encountered.

In Table 1, the various steps of plating operation as practiced by Blue Jay Chrome Products, Inc. are detailed.

The extra buffing operation introduced into the present finishing cycle for coloring the dull copper plate prior to the final, heavy chromium deposit, introduces an extra cost factor and also involves a reracking and handling problem.

However, a completely satisfactory plating job is accomplished, with regard to both adhesion and lustre. No compromise can be permitted in either feature, since durability and appearance are primary considerations among buyers of domestic plumbing fixtures.

As long as castings come from the die casting machine with hardware class finish — that is, with a dense, smooth, unblemished surface — little difficulty is encountered along the plating line. For this reason, hardware finish is part of the specification in the design of die castings. Only the highest quality pieces



As cast above and . . .
. . . as plated below

are acceptable. Examples of raw and plated die castings are illustrated in the accompanying picture.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## COWLES SECRETARY DIES

Chester H. Fisher, 50, secretary and treasurer of Cowles Chemical Company, Cleveland, Ohio, died suddenly July 24 of a heart attack at his home.

Mr. Fisher came with Cowles in 1929, was elected treasurer in 1943 and secretary in 1952.

## ASTE LEADER AT BRITISH SHOW

Joseph P. Crosby, 2nd vice president of the American Society of Tool Engineers and vice president of Lapointe Machine Tool Company, Hudson, Mass., is attending the International Machine Tool Exposition in London, England as an official delegate at representing the 24,000 member technical society. During the Exposition, he will be a guest of both the Machine Tool Trades Association and the Institution of Production Engineers, Great Britain's counterpart of the ASTE.

In addition to attending the London Exposition, which is being held from Sept. 17 to October 4, Crosby will also attend

the Hanover Machine Tool Show to be held in Western Germany on September 19 and 20.

He also plans to tour some jet aircraft factories and visit France and Belgium.

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### TENSILE PROPERTIES OF NICKEL IN NBS REPORT

A study of the effect of temperature on the tensile properties of high-purity nickel has recently been completed by the National Bureau of Standards.[1] Tensile tests were made at temperatures ranging from —320 to 1500 F on annealed specimens of nickel of 99.85 percent purity. The study was conducted by William D. Jenkins and Thomas G. Digges of the NBS thermal metallurgy laboratory.

The new work is a continuation of previous NBS studies of high-purity copper and copper-nickel alloys. These two metals are both available commercially in very high purity, and they and their alloys are suitable for many industrial applications. The two metals have unlimited solid solubility in each other (can be alloyed in all proportions), and these alloys have relatively high strength at elevated temperatures and are corrosion resistant in many environments. For all of these reasons the study of the copper-nickel binary system has considerable interest and significance.

Two series of tests were made in this NBS study of nickel. The first series was made in the range from room temperature to 1500 F. Specimens were 6½ inches long, with 2-inch-long reduced sections of 0.505 diameter. Each specimen was heated and maintained at the desired test temperature, then tested in a hydraulic-type machine (15,000 lb. range). The testing machine applied tension to the specimen producing extension at a controlled rate of about 1 percent per minute. The movement of the head and the tension applied to the specimen

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were recorded by means of an automatic stress-strain recorder.

The second series of tests was made at temperatures ranging from −320 to .12 F. Specimens were essentially the same as those used in the first series, but the procedure had to be modified to permit them to be fully immersed in a liquid bath during the testing in tension. Loading was controlled to produce contraction of the smallest section of the specimen at a rate of approximately one percent reduction of area per minute. A special reduction-of-area gage measured the change in minimum diameter of the specimen during testing.

In both series of tests, specimens were extended to the point of fracture. Fractured specimens were examined metallographically and tested for hardness. Various graphical comparisons of relations between the observed data were then made.

The NBS study of nickel shows that in general the metal's yield and tensile strength, and also the ductility at maximum load, tend to decrease with increase in temperature. The elongation at complete fracture attains a minimum at about 500 F. However, irregularities appear in the usual trends of some of the tensile properties in the temperature ranges of about 80 to 300 F and 500 to 700 F. Strain aging apparently occurs in the range 80 to 300 F, and Curie point behavior in the range 500 to 700 F, while recovery and recrystallization predominate at temperatures of 1200 to 1500 F.

[1]For a detailed report of the study, see "Effect of Temperature on the Tensile Properties of High-Purity Nickel", by William D. Jenkins and Thomas G. Digges, *J. Research NBS 48*, 313 (April 1952).

## WIN SCHOLARSHIPS TO STUDY FINISHING AT NORTHWESTERN

Two Chicago youths have been awarded the first scholarship in the recently established Belke Manufacturing Company, Northwestern University cooperative training program. Robert Blumenthal, age 19, and Gerald P. Glab, 18-year old son of Paul Glab, secretary of the Chicago Branch of the American Electroplater's Society, will begin the 5-year program in Sptember at the Technological Institute of the University in Evanston, Illinois.

On completion of the program the boys will be the first recipients of the new Bachelor of Science Engineering Degree, which has been initiated at Northwestern in connection with this cooperative education plan. Over the 5-year period, the award winners will spend 12 quarters at school studying various engineering subjects, and 6 quarters getting practical experience in local job plating shops, in manufacturing plants with large metal finishing departments, and in the Belke plant. After a year and a half, the students will be practically self-supporting as they will be paid prevailing wage rates while working in industry.

Officials of Belke and the University believe these scholarships will go a long way in solving the critical shortage of trained men in the Electroplating and Metal Finishing Industry.


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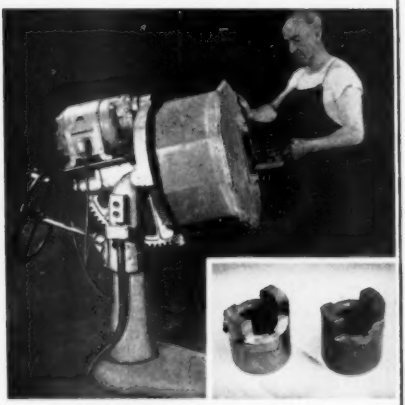

Insulating bushings were formerly deburred with emery wheels at a rate of 300 per hour. With use of a Globe Tilting Tumbling Barrel, production was stepped up to 2000 pieces per hour. In addition to an 85% production increase, the tumbling barrel released two men for work in other departments.

Extra economies are obtained by tumbling odd shaped pieces difficult to deburr with hand wheels. With the Globe Tumbling Barrel. Baker-Raulang has doubled deburring production, and is obtaining finer finishes, using only 3 men in place of 5 men formerly required.

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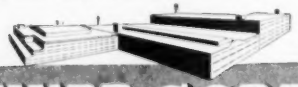

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# ABRASIVE BELTS for high-volume, low-cost cleanup of DIE CASTINGS

ABRASIVE BELTS are commonly used on die castings for the two types of cleanup jobs illustrated here. First is the removal of flash and burrs from irregular contours and the second is the removal of parting line flash and ejector marks from flat surfaces. Type of belts and equipment suitable for this work are shown.

Die castings are used generally because of their favorable high volume-low cost relationship. If manual finishing operations are too slow, this cost advantage is likely to be dissipated over excessive processing operations. Both of the abrasive belt grinding applications presented here have supplanted other, less effective methods, and have helped to speed up production and lower costs.

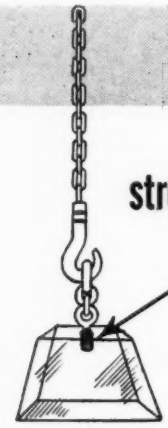
Whether the die parting lies along a flat edge, or around the irregular contour, abrasive belts of varying width and mounted in any of several ways will be an effective method of removing flash. It is almost a standard first operation for processing raw castings.

**INSTEAD OF USING the customary polishing jack, an automobile manufacturer found that deburring and cleaning up edges of an auto trunk hinge could be done better on a flexible belt grinder. On this zinc die casting, a 220 grit aluminum oxide belt was used. Cutting oil and kerosene were applied as a lubricant to prolong belt life. The operator was able to clean 600 pieces an hour on this pre-buffing operation. As a result, one polishing machine was released for other operations. Photos courtesy Porter-Cable Machine Co.**

**DRY PLATEN GRINDING of this flat surface on a zinc die casting grinds faces faster and better than the surface grinder formerly used. The platen under the 10" belt gives a working belt surface that is flatter, and therefore the finished surface is also flatter. Depending upon size of workpieces and amount of material to be removed, output by dry platen grinding ranges from 400 to 1500 pieces per hour on this type of job. Grinding of core marks from the flat surface required approximately 10 seconds.**

# TAP-LOK INSERTS*

## strengthen tapped threads and cut assembly costs

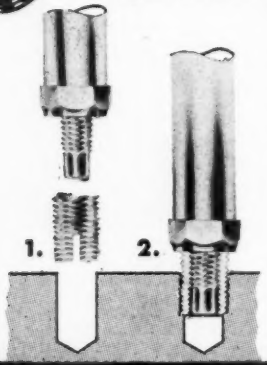


Somebody—usually the customer—gets hopping mad when a thread strips. And his opinion of the manufacturer may be something unprintable. Naturally, it plays hob with sales.

Threads in a part or product made of soft metal, plastic or wood should be strengthened by a steel or brass bushing.

The Tap-Lok Insert is a bushing threaded externally to screw into the parent material and internally to hold the male threaded member. Slotted segments enable the insert to cut its own thread in the drilled or cored hole, equal in size to a tap drill hole for its external thread. This self-tapping feature saves a separate tapping operation and makes the Tap-Lok Insert economical to assemble as original equipment. It withstands vibration without loosening, has maximum torque-and-pull resistance and avoids the time-consuming failures of cast or molded inserts. Tap-Lok Inserts are also excellent for salvage in repairing stripped threads in soft metal.

**Tap-Lok Inserts are easily installed with a special driving tool as follows:**




**1.** The insert is placed in position under the driving tool. The latter is rotated until it fully engages the internal thread of the insert.

**2.** The insert is then turned into the cored or drilled hole, cutting its own thread as it advances until the insert is fully seated. The driving torque is then reversed until the tool is disengaged.

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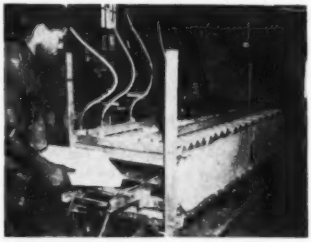
### FAR-INFRARED ELECTRIC HEAT GIVES EFFICIENT MOLD DRYING

Precision plaster molds, used for aluminum casting, are being dried more evenly and precisely with far-infrared electric heat, according to Mr. W. R. Hale, vice president of Scientific Cast Products Corp., Cleveland, Ohio.

Scientific's molds are now dried to the close tolerance of .001 inch per inch as compared with .002 variation under the previous batch type, gas-fired method. In the former batch oven the molds near the top,

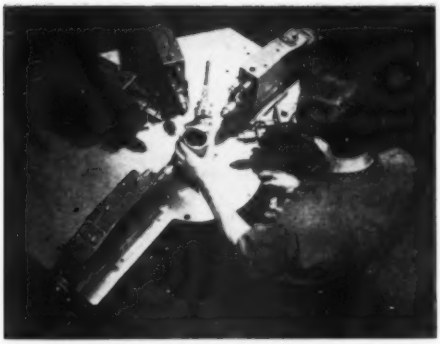


where hot air was forced in, dried faster than those at the bottom. Radiant heat now dries all molds evenly and consistently.

Details of the operation are as follows: A conveyer moves the molds through the oven at about 1½" per minute maximum. The first 8 feet of the 12 foot oven are heated by 36 Chromalox radiant heaters with a total capacity of 39.6 Kw. The longer "far-infrared" wave length is absorbed efficiently even by white materials, with negligible reflection — and rapid heating results in short conveyor travel. One size 12" x 22" x 2½" dries in 2 hours.

In the present operation the production rate is about the same as before. However, the effective production has been raised by reducing formula 25% to 10%, the rejected molds, with further reduction expected as handling is standardized.

More information about mold or core drying with far-infrared electric heat can be obtained from Edwin L. Wiegand Co. by circling No. 204 on the Reader Service Card.



**CORRECT ALIGNMENT between the Locke drill heads and the drill fixture bushings has been accomplished to permit accurate drilling and tapping of aluminum die cast bezels.**

# DRILLING AND TAPPING five holes simultaneously

TO DRILL AND TAP five holes at one time in an aluminum die casting, Beaver Machine and Tool Company of Syracuse, N. Y., recently machined and assembled the setup shown above for the Fayetteville, N. Y., plant of Precision Castings Co., Inc.

This bezel drilling and tapping table is constructed of the following components: five Locke air-opened drilling and tapping units, bezel fixture, fixture clamp, motor support brackets and pedestal. Each Locke unit is powered by a ½ h. p. electric motor mounted under the table. The steel pedestal, 28 inches in height, supports the table.

An operator inserts an aluminum bezel into the fixture, taking care that it is placed properly. Next, he locks the bezel by pulling down the locking clamp. After a solenoid switch in each Locke unit is activated, unit air cylinders build up pressure until each drill head thrusts forward. This forward thrust takes place among the units simultaneously. The five drills enter the bezel fixture drill bushings and drill and countersink the bezel.

Here the speed of air operation, the accuracy of mounting alignment, and the inherent uniformity of the die cast workpiece, have resulted in a precision drilling and tapping operation with minimum time or labor. This type of drill-and-tap operation is widely adaptable to multiple, simultaneous operations, especially when the holes in various planes which would be difficult or expensive to core.

The bezel fixture is cast iron; its drill bushings, hardened and ground steel. Three bushings are 17/64", diameter; and the remaining two, ¼" diameter. An ordinary hammer was used to insert them into the fixture casting to avoid pressing them out of shape.

BECAUSE Hydro-Finish employs fine mesh abrasives suspended in water, it does a precision cleaning job without danger of excessive metal removal. Tolerances are held to .0001"! Result: more years of service from your dies!

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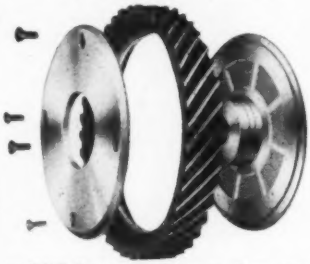

●"61" SERRATED RUBBER CONTACT WHEEL principle has brought an entirely new concept to abrasive belt versatility and performance. *Controlled breakdown* of the bond is the outstanding accomplishment...virtually eliminating glazing and loading—in most cases actually *doubling the productive life* of each belt. "T-61" Universal Hub Contact Wheel —a further improvement—has cut your contact wheel costs virtually in half. When the serrated rubber "tire" wears out, throw it away and replace with new tire at half the cost of standard type wheel. Original cost of complete 3-part assembly is no higher than the previous solid wheel—in some sizes, lower!

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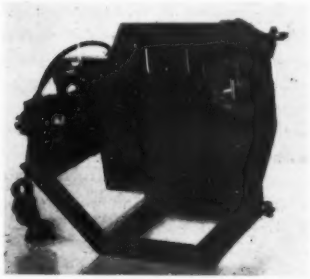
# PMM NEW PRODUCTS

**For additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop the card in the mail—no postage is required.**

## PORTABLE BENCH TUMBLER
*Model "B"*
*Del's Tumbling Service*



SPECIAL FEATURES: Portable bench type tumbler useful for production finishing operations or experimental work. Entire front is a removable, leakproof door. Removes burrs, machine marks, sharp edges, surface defects.

SPECIFICATIONS: Hexagonal shaped, 8" wide x 11" diameter, steel welded construction, water-tight, removable compartment. Holds approximately 2½ gal. of self-tumbling work when loaded 60% full. Compartment is belt driven rotating at 16 rpm. Variable speeds are achieved by varying pulley size. Can be lined with rubber for bright finishing of metals. Has novel tilting arrangement for loading or unloading. Can be operated in either titled or horizontal position. Equipped with Redmond air-cooled motor and speed reducer. Motor 110 volt, single phase, 60 cycle, 1/30th hp.

*For additional information Circle No. 196 on Reader Service Card*

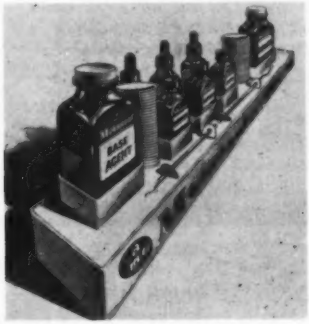
## SEQUENCE DRILL OPERATIONS WITH SINGLE SPINDLE
*Select-A-Spindle*
*Commander Mfg. Co.*

SPECIAL FEATURES: Three-spindle turret head can be attached to any drill press and permits sequence drilling, countersinking and tapping on single drill press spindle. Provides selection of speeds on each spindle at recommended speeds.

SPECIFICATIONS: Capacity on all 3 spindles is 3/8"; adjustable torque control spindles for protecting taps up to ¼" available; quick, positive hand lever indexes turret head without stopping drill press; selected tool rotates only after spindle is indexed and automatically locked; incorporates a variation of the Commander Spring Clutch Tapper and is built to tap on any one, two or all three spindles.

*For additional information Circle No. 197 on Reader Service Card*

## SEALING CASTING DEFECTS
*Metasealer Kit*
*American Metaseal Corp.*



SPECIAL FEATURES: Casting defects, pinholes, blow holes, cracks, chips or surface irregularities can be repaired quickly at low cost right on the spot; includes materials, tools and supplies to repair ferrous and non-ferrous castings.

SPECIFICATIONS: Kit uses Metasealer Plastic Impregnant, a thermosetting plastic that seals castings permanently; does not shrink or corrode; can be machined or finished with paint, lacquer or enamel. Resistant to known solvents and commercial solutions; 100% solids.

*For additional information Circle No. 198 on Reader Service Card*

## ADJUSTABLE PROP FOR DIES
*Saftprop*
*Lempco Products, Inc.*

SPECIAL FEATURES: Adjustable prop holds open a press or die set; capable of supporting 10 tons.

SPECIFICATIONS: Prop consists of cylindrical ram filled with flat steel slugs. When ram is lifted, slugs pour out of opening into an outer cylinder to form a solid mass of steel on which the ram rests. Returned to original position by turning unit upside down. Props made in standard sizes 2½", 3-⅝", 5-3/8", 8" and 12" high. Cylinders are welded steel construction.

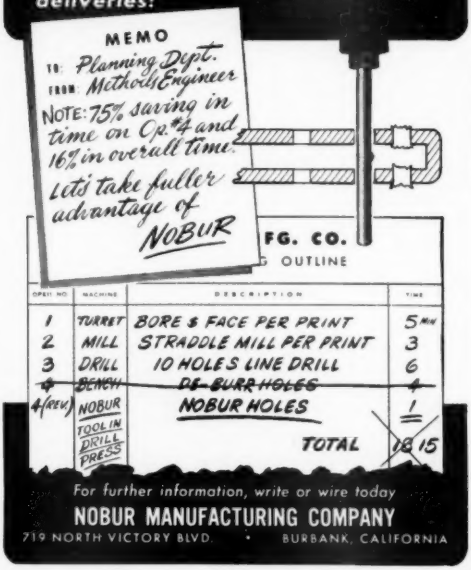
*For additional information Circle No. 199 on Reader Service Card*

continued next page

For additional information Circle No. 71 on the Reader Service Card

**Deburring with NOBUR tool**

on drill press reduces production costs . . . speeds deliveries!


MEMO
TO: Planning Dept.
FROM: Methods Engineer
NOTE: 75% saving in time on Op. #4 and 16% in overall time.
Let's take fuller advantage of NOBUR
FG. CO.
OUTLINE
OPER. NO. | MACHINE | DESCRIPTION | TIME
1 | TURRET | BORE & FACE PER PRINT | 5 MIN
2 | MILL | STRADDLE MILL PER PRINT | 3
3 | DRILL | 10 HOLES LINE DRILL | 6
4 | BENCH | DE-BURR HOLES | 4
4(new) | NOBUR TOOL IN DRILL PRESS | NOBUR HOLES | 1
TOTAL 18 15

For further information, write or wire today

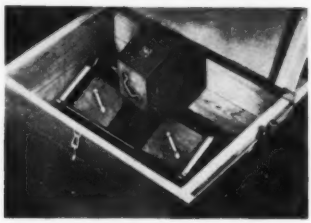
**NOBUR MANUFACTURING COMPANY**

719 NORTH VICTORY BLVD. • BURBANK, CALIFORNIA

New Products continued

## SMALL TUMBLERS WITH COMPARTMENTS

*Pocket Tumbler*
*Tumb-L-Matic, Inc.*



SPECIAL FEATURES: Small barrel has individual "pockets" for tumbling 2 to 6 different items simultaneously; for deburring, precision finishing and polishing small parts such as investment castings, etc.

SPECIFICATIONS: Pocket Tumbler comprises rotating container or "frame" into which the pockets fit; both pockets & frame are hex shaped. Frame is enclosed on five sides during tumbling to hold "pockets" in. Pockets range from 12 to 16 inches in diam. Unit shown is submerged type for wet tumbling; also available as self-contained unit for either wet or dry tumbling. Equipment suited for all methods of tumbling by adding recommended abrasive to any given pocket. Can be furnished with variable speed drives.

For additional information Circle No. 200 on Reader Service Card

**WHICH SOILS ARE HARDEST TO REMOVE?**

- ☐ buffing compound residues
- ☐ pigmented drawing compounds
- ☐ oils and greases
- ☐ heat scale
- ☐ rust, oxides
- ☐ carbon smuts
- ☐ tarnish
- ☐ flux residues
- ☐ rust preventives

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MATERIALS • METHODS • SERVICE

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☐ ALSO send a FREE copy of your booklet *"Some good things to know about Metal Cleaning"*

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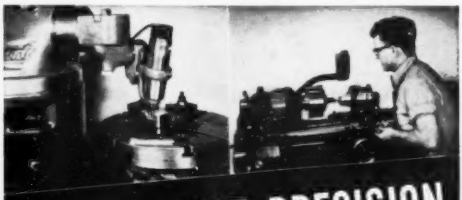
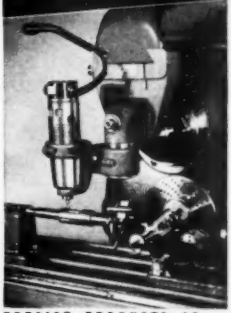


**LOWEST COST PRECISION FOR TOOL ROOM AND PRODUCTION**



**ONE PORTABLE MULTI-PURPOSE PRECISE GRINDER-MILLER WITH MACHINE TOOL MOUNT DOES THE WORK OF A SINGLE-PURPOSE MACHINE COSTING 100 TIMES AS MUCH!**

Little can be done today to reduce labor and material costs. For substantial savings employ new, better techniques. Mount PRECISE Grinder-Millers on lathes, drill presses, milling machines and other machine tools or use in special production set-ups. ¼ HP; speeds from 20,000 to 45,000 r.p.m.; 115 volts, AC-DC. Ruggedly built for continuous duty. All metal housing; rigid PRECISE quill; sealed micro-precision bearings. *High speeds and accurate PRECISE quill and chuck are ideal for tungsten carbide cutters.* PRECISE will grind, mill or finish any material from soft wood to the hardest alloy steel.

*Write* FOR CATALOG

PRECISE PRODUCTS CO., 1342 Clark St., Racine, Wis.

**PRECISE GRINDER-MILLERS**

For additional information Circle No. 73 on the Reader Service Card

## PNEUMATIC SPRAY MASK WASHER

*Sepanski & Associates*

SPECIAL FEATURES: Claimed to reduce mask cleaning time; reduces mask damage; has low solvent requirement; minimum fire hazard; reduced operator fatigue.

SPECIFICATIONS: Portable, self-contained paint spray mask washer operates entirely on air pressure without electrical connections; uses high pressure jet spray that cleans without damaging fine wire bridges. Cleaning cycle fully automatic; can be set for any time required for solvent to dissolve material. Model W-25-H is 35" long, 16" wide, 37" high with mask area 33" x 16" and 10 gal. solvent capacity. Smaller unit also available.

*For additional information Circle No. 201 on Reader Service Card*

---

## SEPARATING PARTS FROM CHIPS IN TUMBLING

*MMG 34-12 Separator*
*Roto-Finish Company*

SPECIAL FEATURES: Designed to separate ferrous or non-ferrous parts from Roto-Finish abrasive chips where both are being processed using Roto-Finish methods. Unique feature is that the magnetic and mechanical separating mechanisms are interchangeable on the portable frame so that unit can be used either magnetically or mechanically.

SPECIFICATIONS: Operation of the separator is simple and efficient. A Hoist Pan containing the mixed parts and processing media is placed on the incline loading support of the separator screen. Separation is made as

continued on page 82


ACROMARK
MEANS ACCURATE MARKING

ENAMEL FILL YOUR DIE-CAST PARTS with THE ACROPRINTER Reg. U. S. Pat. Off.

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Hand and Motor Driven Models

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"The Original Marking Specialists"

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AMERICA'S LARGEST MFGR. OF ADVANCED BARREL FINISHING EQUIPMENT, MATERIALS & COMPOUNDS

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20,000 Experts Admire the Finish AND the Tanks!

Educational Exhibit shows advantages of

LUSTER-ON® and PLA-TANK®

All over the Industrial Finishing Exposition at Chicago, the two big words were LUSTER-ON and PLA-TANK. In the Electroplaters' Institute demonstration shown above a complete zinc barrel-plating line turned out these license plate nuts and bolts by the thousand — all brilliantly finished with long-lasting, corrosion-resisting LUSTER-ON dip.

LUSTER-ON is the original passivating bright dip introduced in 1944 by The Chemical Corporation. Since then it has been adopted by many of the leading industries of the country on such items as auto parts, aircraft parts, hardware items, wire goods, television components, electrical parts, tools, etc. Every day former users of nickel and cadmium are converting to this passivating bright dip.

Naturally the tanks, hoods and duct work were all PLA-TANK Resin-Bonded Fiberglas®, the amazing new reinforced plastic material which resists most plating solutions, acids, dips and rinses. PLA-TANK is the pioneer in this field, designed and built by metal finishing men for metal finishing use.

*Send for free data sheets on Luster-On and Pla-Tank and set of license plate bolts shown.*

THE Chemical CORPORATION

66 Westham Ave., Springfield 9, Mass.

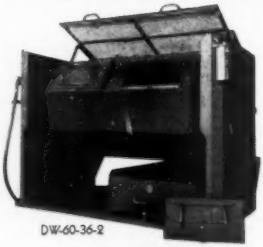
Circle No. 63 on the Reader Service Card

ROTO FINISH
Trademark Reg. U.S. Pat. Office

now!

put your precision finishing on a mass production basis

SAVE MANHOURS AND MONEY . . . the original Roto-Finish processes completely eliminate hand finishing in most instances. GET ABSOLUTE UNIFORMITY . . . in any quantity. MAINTAIN exact tolerance on precision parts. CUT FINISHING costs as much as 80% . . . this fact has been proved many times in actual installations. LOWER INITIAL AND MAINTENANCE costs . . . you need only one Roto-Finish machine to replace several manual grinding or polishing machines. No exhaust system is ever required.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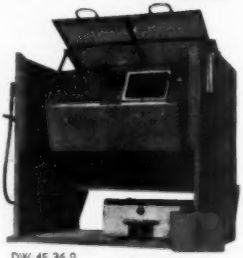
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ROTO-FINISH COST-FREE ENGINEERING SERVICE GUARANTEES RESULTS!

Send a few unfinished parts to us . . . plus a finished part for a guide, (or we'll be glad to pick them up from your plant) for a "no charge" demonstration. Then sit back and let us *prove* that Roto-Finish will finish your parts . . . to your specifications . . . and save you time and money. We *guarantee* that you can get the same results in your plant that we produce in our laboratory. *There is no obligation for this service.*

*Write for fact-packed Roto-Finish Catalog for complete information.*

Roto-Finish COMPANY
associated with The Storgia Products Co.
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*For additional information Circle No. 31 on the Reader Service Card*

## MPA PROCEEDINGS OFFERED IN BOOK FORM

"Powder metallurgy in a defense economy" was the theme of the Eighth Annual Meeting of the Metal Powder Association. Proceedings of the meeting in the form of a 97-page booklet containing all papers, illustrations and discussion are now available.

The meeting took place in Chicago on April 29 and 30 of this year. Papers published in the Proceedings include:

"Recent Practical Applications of Hot Pressing," Jerome F. Kuzmick.

"Powder Metallurgy in the Manufacture of Clocks and Mechanisms," Fred Lux.

"Aspects of Powder Metallurgy in National Defense," John D. Dale, Captain, Ordnance Corps.

"Powder Metallurgy for High Temperature Applications," Julius J. Harwood.

"Carbides — Machining and Ordnance Applications," Malcolm F. Judkins.

"Characteristics of Carbonyl Iron Powders for the Electric Core Industry," George O. Altmann.

"Characteristics of Hydrogen Reduced Iron Powders for the Electronic Core Industry," R. H. Rodrian.

"Characteristics of Electrolytic Iron Powders for the Electronic Core Industry," W. M. Shafer.

"Magnetic Powder Cores for Military Communication Equipment," Eberhard Both.

"Progress in Powder Metallurgy in Europe," W. D. Jones.

"Air Power — A Must in National Security." Russell E. Settle.

Copies of the proceedings are available for $2.50 each from the Metal Powder Association, 420 Lexington Ave., New York 17, N. Y.

# PMM USEFUL LITERATURE

**For additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop the card in the mail—no postage is required.**

## PROCESSES

**High Density Iron Powder Parts:** **No. 144**
Complete technical details concerning the production, properties and uses for high density iron powder parts by National Cash Register Company are offered in a 9-page reprint of an article available from Plastic Metals Div. of National Radiator Co. Includes purchasing agent's specs.

**Stainless & Tool Steel Investment Castings:** **No. 145**
Gathered together in a new folder issued by Engineered Precision Casting Co. are the various steps which go into the making of investment castings. Title of the folder is "Investment Castings of Stainless Steel, Alloy Steel, Beryllium Copper and Most Metals That Can Be Melted."

**Plant for Producing Powder Metal Parts:** **No. 146**
Their complete facilities for contract manufacture of powdered metal parts are illustrated and briefly described in a folder received from Michigan Powdered Metal Products Co., Inc.

**Investment Casting Folder:** **No. 147**
In a booklet entitled "There Is One Right Way to Form These Parts," Hitchiner Manufacturing Co., Inc., presents an introduction to the investment casting process and their own facilities for producing these high-accuracy components.

**Tour of Gray Iron Permanent Mold Foundry:** **No. 148**
An illustrated booklet from the Foundry Division of Eaton Manufacturing Co., is called, "A Picture Tour of the Eaton Permanent Mould Foundry." It shows the company's facilities for producing accurate castings in gray iron.

**How to Produce Small Metal Parts:** **No. 149**
The Dollin Corp. has just released a four-page folder which deals with Dollin's Small Castings Department. Dozens of small aluminum and zinc die castings are illustrated, and factors concerning their use are discussed. Size range runs from 1000 pieces per pound to 3 per pound.

## MATERIALS & EQUIPMENT

**More Die Space in Die Casting Machine:** **No. 150**
A design change in two models of Lester-Phoenix die casting machines that allows additional die space between the beams is introduced in a news item in the current issue (June-July) of the Lester Press. Also contains information on plastic molding.

**Engraving Machine & Accessories:** **No. 151**
An engraving machine and accessories for use on metals or plastics are the subject of a folder B-1 from H. P. Preis Engraving Machine Co. General and heavy duty units suitable for die work are included.

**Photoelectric Flame Failure Safeguard:** **No. 152**
Photoelectric equipment for protecting commercial and industrial oil burning equipment from the danger of flame failure is described in bulletin CA522 from Combustion Control Corp.

**Aluminum Reduction Plant:** **No. 153**
Another in a series of booklets describing its various plant facilities has been published by Reynolds Metals Co. This latest booklet deals with reduction of alumina to aluminum pig at the Troutdale, Oregon plant.

**Standard Drill Jig Bushings:** **No. 154**
A new 6-page folder listing quantity net prices for Colonial ASA drill jig bushings is availabe from Colonial Bushings, Inc.

**Safety Vises for Drill Presses & Band Saws:** **No. 155**
New safety vises for drill presses and band saws are announced in an illustrated brochure from Float-Lock Corp., a subsidiary of American Machine & Foundry Co.

**Seven Types of Industrial X-Ray:** **No. 156**
Seven types of x-ray equipment made by Westinghouse Electric Corp. for industrial application are described in a 4-page folder "Seven Industrial Eyes."

**Instrument for Melting-Point Studies:** **No. 157**
Details concerning the new Aminco-Furst Meltometer are contained in a bulletin from American Instrument Co. The instrument makes possible temperature-optical transmission studies and automatic determination of melting point, solidification point, softening point, dehydration point, etc.

**Combination Sintering & Hardening Furnace:** **No. 158**
Data is available from C. I. Hayes, Inc. concerning their Model C-10 furnace being used for sintering at a New England factory, and also, as a hardening furnace.

**Industrial Metal Fasteners:** **No. 159**
In the new Southco Handbook of Fastening Specialties there are 22 pages of information on industrial fasteners for metal to metal and metal to wood applications. The spiral-bound book also contains several pages of frequently used engineering data.

**Tool Holder for Turret Lathes, etc.** **No. 160**
Information from Scully-Jones & Co. is offered concerning their new sleeve type stub taper turret tool holder. It is designed for holding counterbore cutters, countersinks, core drill cutters and similar tools having standard stub taper shanks.

## FINISHING

**Recommended Practice for Plating Aluminum:** **No. 165**
Latest recommended practices for electroplating aluminum alloys are contained in Bulletin No. 7 from the New Kensington laboratories of Aluminum Company of America. Special attention is called to new zincate solution composition.

**Detergent Cleans Aluminum, Magnesium:** **No. 166**
Rapid cleaning of aluminum, and anodized aluminum and magnesium parts in power washing equipment is made possible by a new detergent PWB No. 81 from Kelite Products, Inc. The detergent and its characteristics are described in literature.

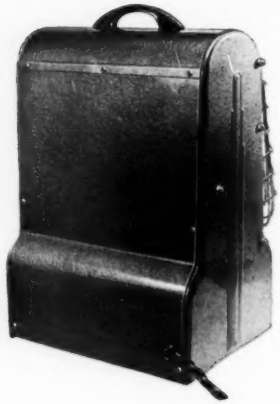
**Cost Analysis Chart for Polishing & Buffing:** **No. 167**
A Cost Analysis Check Chart for accurately computing the cost of polishing and buffing operations has been made available by the E. Reed Burns Mfg. All factors are neatly listed on a stiff paper card and it is a simple matter of jotting down appropriate figures under each item to compute the actual "net" cost.

**Control for Abrasive Belt Backstands:** **No. 168**
Backstands for abrasive belt operations are featured in a folder from Divine Brothers Co. Particular emphasis is given to the DBA "Tensionaire" backstand with automatic air tension control.

**Immersion Tinning of Copper & Brass:** **No. 169**
Immersion tinning of copper & brass without an outside source of electric current is the subject of technical data sheet No. 111 from Metal & Thermit Corp., Chemical Div.

*This man can show you . . .*

# How to make *stronger* assemblies and save fastening time



*Lasting security of fastenings is imperative in assembly of this Fan-Glo Heetaire, to resist vibration and insure rigidity. Seven P-K Type A Phillips Head Sheet Metal Screws fasten the CRS back cover to the welded case–can be easily removed and replaced when necessary. All screws are driven with air-operated driver in ½ minute.*

*Type A Hardened Sheet Metal Screw, one of five standard types of P-K Self-tapping Screws, shown with Phillips Recessed Head. Made also with slotted head.*

Ask a P-K Assembly Engineer how you can improve product strength. Often, a switch to P-K screws gives you a double advantage. You get fasteners that set up tight and *stay* tight. You also get a *simpler* fastening method that makes record savings in assembly time.

The P-K Assembly Engineer's experience is based on more than a million applications of P-K Screws in the nation's best-known products. He can quickly tell you which type, from Parker-Kalon's *complete* line, will help you make better, faster, stronger assemblies, at lower cost.

Today, more than ever, the P-K Assembly Engineer is a good man to have on your production team, showing you the shortcuts in assembly that will help you beat the squeeze on profits. He'll call at your request. Parker-Kalon Corp., 200 Varick Street, New York 14.

**DELIVERIES ARE BETTER CHECK WITH P-K FIRST**

**Your P-K DISTRIBUTOR** *has good news. His stocks of P-K Screws are steadily improving. The size and type you need may now be readily available. Ask about it. Plan now to make your assemblies with the original, quality-controlled P-K Screws. Remember—"If it's P-K . . it's O.K."*

P-K TRADE MARK REG. U.S. PAT. OFF.

# PARKER-KALON®

*The Original* **SELF-TAPPING SCREWS**

**FOR EVERY METAL AND PLASTIC ASSEMBLY**

*For additional information Circle No. 24 on the Reader Service Card*

# REFERENCE MATERIAL, catalogs and data offered free in this month's ads (circle numbers on reader service card.)

4. DIE CASTING MACHINE SPECS are offered in a bulletin from Cleveland Automatic Machine Co.

5. NEW PRINCIPLES OF CONSTRUCTION for a die casting machine are introduced in a specification bulletin from Cuyahoga Industries.

6. DATA SHEET ON STANDARD EJECTOR pins is available from Detroit Mold Engineering.

7. SMALL DIE CASTINGS produced by Dollin Corp., Small Castings Dept., are the subject of a booklet.

10. COMPLETE LINE OF DIE CASTING machines is presented in a catalog from Kux Machine.

11. SPECIFICATIONS FOR DIE CASTING machines are available in literature from Lester-Phoenix.

13. HYDRAULIC OIL FILTERS produced by Marvel Engineering are presented in a data sheet.

14. FACTS ON PERMANENT MOLD and die cast parts are offered in a Fact File from Monarch Aluminum .

18. DIE CASTING FACILITIES of Pressure Casting, Inc., are offered in a descriptive, illustrated folder.

20. ALUMINUM HEAT CONTENT CHART and furnace specifications are offered by Stroman Furnace

21. ALUMINUM ALLOY SELECTOR to aid in analysis of foundry problems is offered by U. S. Reduction.

23. TWO METAL CLEANERS — an electrocleaner and a heavy-duty soak tank cleaner for zinc die castings are subjects of 2 bulletins from Diversey.

25. DIMENSIONING DIE CASTINGS is the subject of a guide book from Newton-New Haven Co.

26. WALL CHART ON LUBRICANTS for die casting dies is available from G .W. Smith. Can also serve as file folder.

28. IRIDITE FOR PROTECTING metal surfaces is described in literature from Allied Research.

29. SCREW THREAD INSERTS for use in die cast metals are the subject of a data sheet from Groov-Pin.

30. BARREL FINISHING data book is offered by Minnesota Mining & Mfg.

31. MASS-PRODUCTION FINISHING by use of barrel techniques is the subject of an informative book from Roto-Finish.

33. LUBRICANTS FOR POWDER metallurgy are described in literature on zinc stearate issued by American Cyanamid.

35. METAL-OF-THE-MONTH is a monthly resume of metal market news and data from Belmont Smelting & Refining Co.

37. DIE CASTING MACHINE specifications are presented in a catalog from Cast-Master, Inc.

38. ZINC ALLOY SUPPLIERS, Henning Brothers & Smith, offer a monthly house organ called The Henning Messenger.

39. HOW TO DESIGN aluminum & magnesium die castings is the subject of a data book from Litemetal Dicast.

43. CONTROL OF METAL DRIP between faces of die casting dies is covered in literature from Ring Valve Co.

44. COMPLETE CATALOG of midget mills, chatterless countersinks, ball reamers, files and other small tools is offered by Severance.

46. PRESSES FOR MOLDING plastic patterns used in investment casting are described & illustrated in a catalog from Van Dorn Iron Works.

47. BARREL BURNISHING of small parts is thoroughly presented in a manual from Abbott Ball Co.

49. DIE CASTINGS FOR DEFENSE is the subject of a booklet, "We're Geared for Your Defense Needs," from Advance Tool & Die Casting.

53. SMALL DIE CASTINGS — review of size, alloy & design limits in a folder from Gries Reproducer.

55. DESIGNING FOR POWDER metallurgy is the subject of an engineer's handbook from International Powder Metallurgy.

continued on page 60

# Make the HAMMER Test!

## See why Super-Honite Chips last twice as long!

**REGULAR HONITE FOR TOUGHEST NATURAL CHIP**—No other natural barrel finishing abrasive—not even granite—retains its edge as long as regular Honite. Use it for close tolerance work or where a minimum of metal removal is required.

Hit an ordinary synthetic chip with a hammer. See how it crumbles, pulverized by the force of the blow. Now, hit a piece of Super-Honite the same way. See how *it* fractures in cleanly-divided, large segments. Takes a *harder* blow! The hammer test shows how Super-Honite—the world's toughest abrasive chip—stands up better than any other barrel finishing abrasive. Eliminates lodging. And Super-Honite is the *only* chip engineered for both grinding and burnishing . . . the *only* chip you can rely upon for double duty, double life performance.

*Make the hammer test and see the difference! See why Super-Honite never crumbles.*

**Write today** for your free copy of "3M Barrel Finishing" . . . filled with helpful information on increased efficiency, lower costs. Address Minnesota Mining & Mfg. Co., Dept PMM-92, St. Paul 6, Minn.

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63. DATA SHEETS on Luster-On passivating bright dip for zinc die castings, and Pla-Tank reinforced plastic material for plating equipment, are offered by Chemical Corp.

64. FINE ABRASIVES suspended in liquid for surface finishing is the subject of a bulletin from Pangborn on Hydro-Finishing.

66. IMPREGNATING POROUS CASTINGS is reviewed in a brochure from Metallizing Company of America which tells how to salvage porous castings.

67. SHELL MOLD CASTING facilities newly opened by Die Mold Casting Div. of P. M. P., are the subject of literature.

68. REFERENCE FOLDER on a line of P-V investments for the investment casting process is offered by Pre-Vest.

71. DEBURRING OF HOLES by means of a new type of tool is the subject of a folder from NoBur.

72. SOME GOOD THINGS to know about metal cleaning is the subject of a booklet from Oakite.

73. MULTI-PURPOSE GRINDER & MILLER unit is presented in a piece of literature from Precise Products.

78. FILLING ENAMEL in recessed designs or lettering is described in literature from Acromark.

79. BARREL FINISHING is discussed in 3 booklets from Almco Div., Queen Stove Works, covering the process, materials & equipment.

## PROMOTIONS AND APPOINTMENTS

RUSSELL L. BROWN has been named sales manager of the Chicago branch office of *Sonken-Galamba Corp.* Chicago office is at 188 W. Randolph St.

Three high level changes in research staff have been announced by *Dow Chemical Co.* They are: L. C. CHAMBERLAIN, formerly manager of research for the plastics department, to be assistant to the director of research; RAYMOND F. BOYER to replace Chamberlain; DR. WILLIAM C. BAUMAN to be director of physical research.

IRVIN E. FRYE has been appointed mananger of the *Foundry Div. of Fischer and Associates*, Cleveland consulting engineers.

R. R. ROBERTS has been named manager-finance of the *Carboloy Department., General Electric Co.*, replacing S. B. STROM who will be manager-finance for *Components Products Div. of G. E.*

WALTER S. SCHAMEL has been appointed district manager of the Los Angeles office of *American Wheelabrator and Equipment Corp.*

RAYMOND T. WHITZEL has been made general manager of the smelting division of *Aluminum Company of America* succeeding V. C. DOERSCHUK who will become technical consultant, chiefly on aluminum smelting and related problems.

CARL E. ALLEN, president of *Campbell, Wyant and Cannon Foundry Co.* in Muskegon, Mich., has been appointed to the board of directors of *Dow Chemical Co.*

GEORGE J. BRUYN, manager of the Niagara sales office of *Hooker Electrochemical Co.* has been appointed chief of the Alkalies Section, Inorganic and Agricultural Chemicals Branch, Chemical Div., N. P. A.

continued on page 70

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BETTER METHODS
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BETTER DIE CASTINGS
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Through a quarter of a century of knowing how, the Super Cast reputation for Better Methods—Better Die Castings, has been recognized.

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**PLASTER MOLD CASTINGS**

continued from page 38

universal joints and castings that must maintain strength and ductility at elevated temperatures, non-sparking tools, brush holders, bearing retainers, hardware fittings, placques, valve bodies, clip fasteners, food and dairy products, cable clamps and electrical connectors.

cores, producing surfaces that are smooth and clean.

Castings and self-rivets are cast integrally, and markings, letters and numbers, either raised or depressed, are easily reproduced.

Castings run uniformly to ordinary machine tolerances with limits, depending on size and design, running from plus or minus .005 to plus or minus .010 on one side of the parting line. On dimensions which cross the parting line, the tolerances are slightly higher. The draft on internal vertical surfaces, such as small holes, can be as little as .004 to .005 per side. Draft on outside verticle surfaces is not normally required. Holes are cast ready for tapping or reaming.

Die patterns are made in split style, each portion being mounted on ground machined unit strips. Since many different die patterns can be combined in one mold, the customer does not have to buy a full flask of die patterns unless he uses a special alloy or his volume requires it. The life of the die patterns is practically unlimited, inasmuch as they are not subjected to abrasive mold materials, impact, high temperatures or molten metal.

The range and uses of alloys in current production offers a wide scope for users. Alloy specifications include yellow brass, aluminum bronze, high tensile manganese bronze, high strength aluminum, and aluminum alloy, plus many other copper-base alloys.

Among the products produced by the plaster mold process are communication instrument and pump parts, aircraft fittings, pistons, cylinder heads, torque converters, impellers, gears, sprockets, control levers, bearings, marine equipment, acid resisting pump parts, wing nuts,

Editor's Note: Part Two of this article will appear in the October issue of PMM and will offer information concerning alloys and their properties.


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American Major Industries are now sending their dull cutters to Severance for regrinding because they know (1) strategic material is being conserved (2) quick deliveries are assured (3) their reconditioned tools will give new-tool performance, and (4) their production costs are lowered. This SEVERANCE SERVICE is paying-out for others — It will Pay you too!

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*OUR COMPLETE CATALOG IS YOURS FOR THE ASKING! IT INCLUDES LOW REGRINDING PRICES.*

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**"ECLIPSE" NAME TO BE USED**

To simplify product recognition, the name "Eclipse" will be used to identify all gas and oil-fired industrial appliances manufactured by Eclipse Fuel Engineering Company, Rockford, Illinois.

All products such as steam-boiler plants, Dowtherm vaporizers, gas burners, blowers, proportional mixers and valves, formerly marketed under the McKee name, will now be recognized by the new "Eclipse" trademark.

The McKee name has long been associated with many of the diversified products developed since Mr. McKee founded the company, 44 years ago.

# THREAD INSERTS ELIMINATE SEIZURE, FAILURE OF BOLTS

A Trenton manufacturer of induction furnaces for the foundry, die-casting and other industries has improved product design and overcome a serious maintenance problem by using stainless steel wire thread inserts in his assembly.

Substantially, these furnaces consist of two units; an inductor unit housing induction coils which carry up to 2,000 amperes and a main housing, up to about 100x60x140 inches in size, which contains the hearth. The sections are joined along machined faces by from 10 to 20 bolts, (5/8-11 or 3/4-10) depending on the size of the furnace and its attached inductor. These Ajax Engineering Co. furnaces range in power rating from about 20 to 1000 kw.

Because it is sometimes desirable to change or replace inductor units ease of maintenance dictates that disassembly be simple and rapid. Yet to use flanges which would accept bolts and nuts would have introduced undesirable design elements. For one thing, such a flange would separate the two elements of the furnace by three to four additional inches. Also, it would add considerably to the cost of weldment.

Accordingly, cap screws are employed in tapped blind holes. In use, these bolts are exposed to temperatures in the neighborhood of 200 F; also, they are in close proximity to an intense magnetic field.

In early models, attempts to remove cap screws after the furnace had been in use for a considerable period met with a high proportion of failure. Often, the screws were found to have seized in the threads, with the result that they would twist off. The resultant cost in man-hours and increased down-time needs no elaboration.

Seeking to avoid this seizing, the manufacturer experimented with various classes of thread fit, and tried brass bolts, but neither expedient produced any improvement. The next remedy was the use of Heli-Coil inserts —thread inserts made of stainless steel wire precision-formed to a diamond-shaped section. They have abolished the seizing trouble, and have been adopted as standard equipment.

The performance of these inserts in high-heat applications where ordinary bolts become decarburized and brittle was not unexpected. Beyond that, however, it is the opinion of Ajax engineers that some of the earlier trouble may have stemmed from the action of the magnetic field on the unprotected bolts. It is considered possible that bolts threaded into the Heli-Coil inserts resist this action because they are shielded, in a sense, by stainless steel which is only very slightly magnetic.


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Since 1903

### M. J. DAY TO HEAD MATERIAL-PROCESS DIV.

A steel consultant to the nation's arms program, Dr. Maurice J. Day, metallurgical engineer at U. S. Steel Co., Pittsburgh, Pa., has been named manager of the materials and processes division at Armour Research Foundation of Illinois Institute of Technology.

Dr. Day's appointment as one of the Foundation's three division managers was announced today by W. E. Mahin, director of research.

He succeeds W. A. Casler, who has been acting manager of the division since May, 1951. Mr. Casler continues as assistant director of research and manager of program development.

As manager of the materials and processes division, Dr. Day will direct reseach and development activities of 300 scientists and administrative personnel.

Shop foremen say:

"When you need ZAMAK zinc base die casting alloys HENNING can't be beat!"

Ask any man who has worked with our product and he'll give you a dozen reasons in five minutes why he wouldn't use any other. Try it and be convinced.

Return the coupon to receive our monthly house organ and booklet covering all ZINC base ALLOYS.

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# ALLOY CASTING INSTITUTE REPORTS ON RESEARCH IN HIGH TEMPERATURE ALLOYS

Meeting at Hot Springs, Va., in their 12th annual convention, members of the Alloy Casting Institute, a technical association of high alloy foundries, were given a complete picture of the accelerated progress being made in the vital field of high alloy castings materials and techniques.

Reporting to the assembled technical and operating executives of the nation's high alloy foundries, R. H. English, chief metallurgist, National Alloy Steel Division of Blaw-Knox Company, Pittsburg, Pa., and outgoing chairman of the Institute's Technical Research Committee, gave a detailed picture of intensive technical research being sponsored by the Institute at Ohio State University and at the Battelle Memorial Institute, Columbus, Ohio.

Research at Ohio State has been carried out on the evaluation of titanium as a substitute for columbium in the cast stainless steel alloys. A final report on this work will be presented to the technical committee of the Institute in September.

The research at Battelle, according to Mr. English, was concentrated on high temperature work, with the majority of the effort being devoted to a study of the 20% chromium, 9% nickel composition type for elevated temperature service (recently announced by the Institute.) Maximum and minimum amounts of chromium were investigated, as they affect thermal fatigue properties and strength at elevated temperatures.

Other high temperature programs scheduled for the following year include a study of the correlation of thermal fatigue and stress rupture properties of of the 35% nickel, 15% alloy composition range. Mr. English also announced the completion of a study of the effect of composition on resistance of high alloys to corrosion by neutral heat-treating salts. The results of this program will be presented before the annual Metal Congress in October, 1952.

### LAMMOT DU PONT DIES

Lammot du Pont, former president of E. I. du Pont de Nemours & Company died July 24. He was 71 years old.

Illness that had confined him to his Fishers Island, N. Y., summer home for several weeks kept him from the side of his two brothers, Pierre and Irenee at the company's 150th anniversary ceremonies a few days before his death.

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Cyanamid Zinc Stearate's *extremely small particle size, high covering power* and *great bulk* can provide the answer to *your* lubricating problems – can speed up your processes and improve the quality of your moldings.

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# METALLURIGAL ARTICLES TO BE FEATURED IN OCTOBER PMM; RECOGNITION FOR METAL SHOW

Metallurgical aspects of the metal forming techniques covered editorially by PRECISION METAL MOLDING magazine will be emphasized in the special October issue to be distributed at the National Metal Exposition.

The exposition will be held in Philadelphia October 18-24 at the Philadelphia Convention Halls in conjunction with the 34th National Metal Congress. It is expected to attract many thousands of engineering, production, executive and research men from the field of metals.

In recognition of the concentrated interest in metallurgical and technical subjects, PMM will offer several special articles among which are:

- Spectrographic analysis of zinc base die casting alloys,
- Comprehensive survey of investment casting, with emphasis on the alloys and their properties,
- Outline of some of the properties and characteristics of the new chrome carbides produced by powder metallurgy,
- Survey of alloys that can be plaster mold cast,
- Vacuum metallizing techniques for coating die castings,
- Production of special melts of alloys for investment casting.

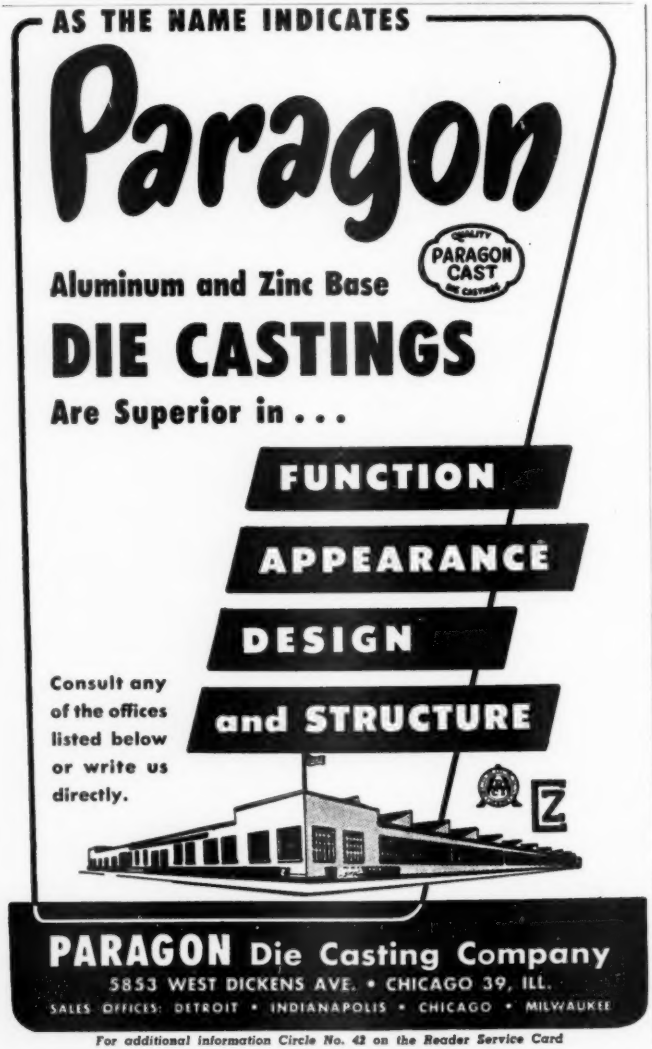
Precision Metal Molding will be distributed from the magazine's booth, No. 1361, at the Metal Exposition, where it will mark its first anniversary since the expansion of its editorial field to cover five precision molding techniques.

The Metal Congress and Exposition are jointly sponsored by the American Society for Metals, the American Welding Society, the Institute of metals Division of the American Institute of Mining and Metallurgical Engineers, and the Society for Non-Destructive Testing.

More than 400 nationally-known firms engaged in the production of metals, the treatment of metals, the fabrication of metals into component parts or products, or in rendering services to these firms, will be among those exhibiting at the Exposition.

Nearly five acres of floor space will be covered for display and demonstration. In addition, thousands of square feet have been set aside for the meetings, forums, lectures and other activities connected with the Congress. Many technical programs are scheduled.

Theme of the seven days of meetings and five days of exhibitions will be "Metal Keeps The Peace."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# PMM INDUSTRY NEWS

## AMERICAN DIE CASTING INSTITUTE OPENS 25th YEAR; FEATURE TECHNICAL PAPERS AT MEETING

Beginning its 25th year of life, the American Die Casting Institute will bring its members together this month for the annual business and technical sessions which have served as a focal point for the organization's constructive activities over the years.

Meeting in Chicago September 17 and 18 at the Edgewater Beach Hotel, the Institute has lined up a program of papers which should attract the largest attendance in its history. Following a general membership meeting on Wednesday morning, the program announced by David Laine, Secretary of the Institute, is as follows:

A panel of three safety directors will address the group Wednesday afternoon on the subject "Whose Accident Was It?" This marks a continuance of the Institute's emphasis on safety in the die casting industry, climaxed last year by the publication of a new Safety Manual. Taking part in the panel will be Byron Van Horn of Doehler Jarvis Corp., Norman Dress of Precision Castings Co., Inc., and Charles Sanford of Cleveland Hardware & Forging Co.

Following the safety panel, a cost accounting session will be held, centered about a paper by Ralph Knapp of Precision Castings Co., Inc., on the subject, "The Cost of Aluminum Die Castings Compared with the Cost of Zinc Die Castings."

A special panel made up of R. Bernhardt of Doehler-Jarvis Corp., Walter Goldhammer of Superior Die Casting Co., and C. A. Stone of Stewart Die Casting Division of Stewart-Warner Corp., will take part in a discussion of cost comparisons following Mr. Knapp's paper.

Two sessions on Thursday morning, September 18th, will be held. The first will be a panel discussion on "Growth of Statistical Quality Control in Industry and the Production Problems Involved." Discussion will be led by a team of experts from the Chicago Section of the American Society for Quality Control.

The second session will be a technical meeting at which H. N. Maier of Doehler-Jarvis Corp. will present a paper, "Metal Flow Characteristics in Die Casting Dies." For the discussion that follows Mr. Maier will be joined by a panel of Institute metallurgical committee members who have been studying this subject.

Two social events of the sessions will include the banquet Wednesday evening at which the annual Doehler Award will be presented, and the luncheon given for Institute members by Precision Metal Molding magazine.

### ALUMINUM CASTINGS OFF IN FIRST HALF OF 1952

According to a report from the Bureau of Census, Department of Commerce, shipments of aluminum base alloys during the first half of 1952 were down from the comparable period in 1951.

Total shipments in 1952 amounted to 280,375,000 pounds compared with 300,892,000 pounds in 1951. Current output of die and permanent mold aluminum castings listed in the report show 81,989,000 pounds of die castings and 80,295,000 pounds of permanent mold castings, the balance being divided between sand castings and "all others".

The Bureau also reported a first half gain of from 15,577,000 pounds of magnesium castings in 1951 to 19,256,000 pounds in 1952.

### CARBORUNDUM PLANT TO PRODUCE SPONGE METALS

A new plant for the production of zirconium and hafnium sponge metals is to be built by The Carborundum Metals Company, Inc., a recently formed subsidiary of The Carborundum Company, it has been announced by Clinton F. Robinson, president of The Carborundum Company.

The plant will be located just outside the village line of Akron, New York, south east of Niagara Falls.

### ONLY A CIPHER, BUT . . .

In an article describing some components in the White sewing machine (PMM, July 1952, pg. 33) reference was made to a small powdered metal slide block made for White Sewing Machine Corporation by Precision Metal Products Company of Ellwood City, Pa.

It was pointed out that a tolerance of ± .001 is being held on this part. However, it has been called to the attention of PMM that the bore diameter of the piece is actually being held to a tolerance of ± .0001 on a production basis. Since this is an exceptional job, the editors have checked further with White engineers to verify this, and are assured that this close tolerance is being met.

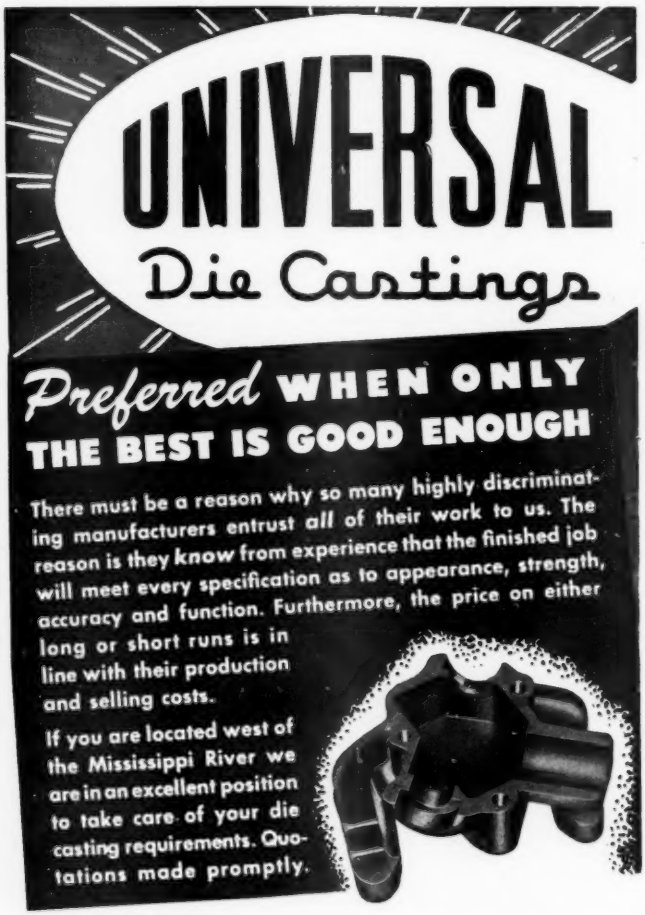
### GRIES REPRODUCER NAMES TWO SALES REPS

Appointment of two sales representatives for Gries Reproducer Corp. of New York has been announced by Joseph Saks, sales manager. In an area including Minnesota, the Dakotas and western and northern Wisconsin, A. A. Hume of Minnesota will handle the Gries line of fastenings and services in the production of tiny zinc die castings and plastic moldings.

Jay C. Angel & Co. of Chicago will represent Gries in the Chicago metropolitan area.

### INVESTMENT CASTING MATERIAL IS SUBJECT OF REPORT

A report issued by the U. S. Air Material Command and now available from the Library of Congress covers an investigation conducted to study the feasibility of using less critical materials for the investments now used for the precision investment casting process. Investments were formulated from less critical materials and several proved satisfactory as substitutes. Title of the 12-page report is "Study of Investments for Precision Casting Process." It is available from the Library of Congress, Photoduplication Section, Washington 25, D. C. Microfilm $1.75; Photostat $2.50. Code No. of report — PB106600.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There must be a reason why so many highly discriminating manufacturers entrust all of their work to us. The reason is they know from experience that the finished job will meet every specification as to appearance, strength, accuracy and function. Furthermore, the price on either long or short runs is in line with their production and selling costs.
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### INVESTMENT CASTING DEVELOPMENTS REPORTED

Latest developments in the "lost-wax" investment casting process are described in a government report reviewed in the current issue of the *Technical Reports Newsletter* just released by the Office of Technical Services, U. S. Department of Commerce.

Also discussed in this issue of the Newsletter are research reports on: electroplating and protecting metals; a guide to higher productivity in packaging foods; an electrical method of making blood counts; and ways to make better internal combustion engines.

A feature of the July Newsletter is an article which tells American small business leaders how to make profitable use, in patent matters, of technical developments made in Germany during World War II.

Single copies of the July 1952, *Technical Reports Newsletter* are available without charge from the Office of Technical Services of the U. S. Department of Commerce, Washington 25, D. C. or from the U. S. Department of Commerce Field Offices.

### PRECISION METALSMITHS EXPAND SALES STAFF

In an expansion of its sales organization, Precision Metalsmiths, Inc., Cleveland, O., has named representatives in Mich-

igan, Minnesota and Pennsylvania.

R. L. Tate of the C. B. Lawrence Co., 404 Frick Bldg., Pittsburgh, Pa. will represent the Cleveland investment castings firm in western and southern Pennsylvania and western West Virginia.

Bader Tool & Engineering Co., 1106 East Lake St., Minneapolis, Minn. will cover the entire state of Minnesota and western counties of Wisconsin.

David T. Applebee, 6 Monument Square Bldg., Grand Rapids, Mich. will cover all of western Michigan.

### OFFER MASTERS DEGREE IN METALLURGY AT N. Y. U.

A new graduate curriculum leading to the degree of Master of Science in Metallurgy has been announced by New York University for the first time with the opening of the regular academic year tris month. Curriculum will stress metals technology and physical metallurgy.


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What MILWAUKEE'S New Plant Offers You

... every Facility for Complete Die Casting Service to Help You Make a Better Product

The experience and knowledge gained in helping others realize the full benefit of the die casting process . . . for more than 40 years . . . is a Plus Value for all MILWAUKEE customers. Coupled with the modern facilities of MILWAUKEE'S new plant, it can help you produce a better product, with greater sales potential, at a lower net cost.

We operate under the Certified Zinc Plan of the American Die Casting Institute, Inc.

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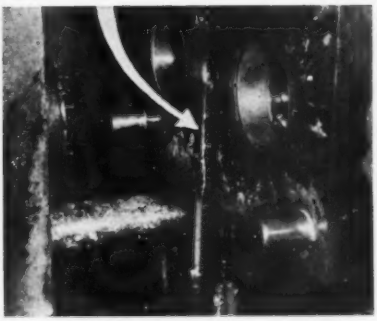
FOR ZINC DIE CASTING MACHINES

Stop DRIP on front die with

Ring "No-Drip" • Control



This control prevents die damage and costly die repairs caused by metal drip on front die as die opens, regardless of cycle time.

Easily installed, positive in action, trouble-free, it pays its way FAST. Only one moving part.

Ring "NO DRIP" Control is quickly adjusted to different time cycles. It permits free flow on shot stroke, retards speed of plunger on return stroke. This creates a vacuum which withdraws metal from nozzle on upward movement after die separation, preventing "run-out". Leaves a clean sprue with no drip or needle point. No need to run with cold nozzle . . . you get better results!

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The Most Complete and Modern Die-Casting Facilities in New England

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You can depend upon our proven know-how to design and develop your most intricate castings.

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PROMOTIONS
continued from page 61

LLOYD J. BOHAN of Los Angeles, Cal., has been appointed sales representative in Southern California and Nevada for *Michigan Steel Casting Co.*, Detroit.

CLIFFORD R. PALKIE has joined the staff of *United Chromium, Inc.* as assistant sales manager in the Organic Coatings Division.

RICHARD T. VOELZ and TRUMAN S. BROWN were recently appointed field representatives for the Chicago and Los Angeles sales offices, respectively, of the *F. J. Stokes Machine Co.* of Philadelphia, Pa.

CLIFFORD S. VAUGHN has


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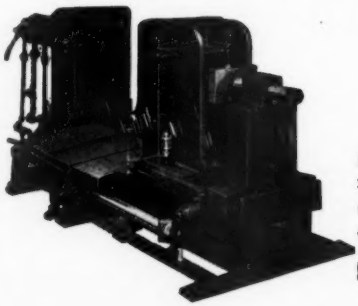

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been named assistant Western Regional Manager of *The Bellows Company of California.*

FRED D. MARTIN, formerly assistant plant manager for three plants of *Speer Carbon Co.*, has been named plant manager of the entire St. Mary's Pa., manufacturing facilities of the company.

LOUIS V. GANON has been appointed Massachusetts sales representative for *Frederic B. Stevens, Inc.*

RALPH O. BETTISON has been appointed field engineer in the Pontiac, Mich., area, by *The Bellows Company.*

HARRY L. SMITH, JR., has been made staff manager, product sales, for *Aluminum Company of America*, and will be replaced as manager of sheet and plate sales by W. T. Mitman of Alcoa's Washington, D. C., sales office.

RAYMOND E. LAPEAN, executive vice president of Chemical Construction Corp., has been named managing director of *Cyanamid Products, Ltd.*


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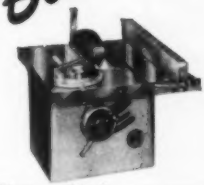
Better CASTINGS

(NON-FERROUS)

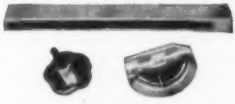
SAND CASTINGS
PERMANENT MOLD
DIE CASTINGS



Illustrated below are some of the parts for this saw cast at our foundry.

*Hampden Brass & Aluminum Co.* is fully equipped to handle all casting problems — from engineering to finished casting.

*PATTERN SHOP • X-RAY & LABORATORY FACILITIES*



PERMANENT MOLD CASTINGS

SAND CASTINGS

*PRESSURE CASTINGS • HEAT TREATING*

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INCORPORATED 1903

SPRINGFIELD 1, MASSACHUSETTS

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specialists in small Die-cast Parts

**45 YEARS** of engineering skill and experience in the mass production of quality small zinc and lead base castings.

*inquiries invited*

send specifications or blueprints for quotation.

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Whatever your casting problem may be—die cast—permanent mold or sand cast specify S-G Aluminum Alloys. Every step in their production is checked constantly by skilled laboratory men using the most modern equipment available. Our facilities are available to help you solve your specific problems.

Trouble-free production of quality castings doesn't just happen. The skill and know-how of diecaster or foundry is of prime importance. But the most skilled of craftsmen must have the right type of ingot.

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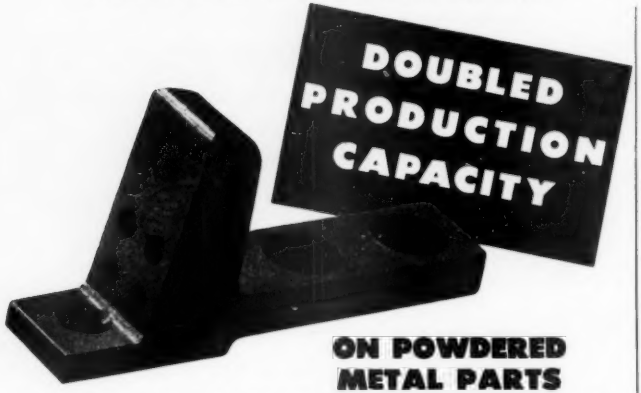


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International Powder Metallurgy Co. announces increased production facilities for step-by-step production of top quality powdered metal parts. At your command are complete facilities—engineering and design, tool and die making, machining and finishing.

Contact holder on business machine illustrates contoured shaped, ready-to-assemble part molded and machines to exacting specifications.

*Now available—The Powder Metallurgy Engineers Handbook. Send for a copy on your company's letterhead.*

**International Powder Metallurgy Co.**
439 W. MAIN STREET • RIDGWAY, PENNSYLVANIA

**OPEN SALES OFFICES**

Expansion of service to aluminum fabricators through the establishment of nine new sales offices and five newly appointed distributors has been announced by Bert Inch, vice president in charge of sales, Kaiser Aluminum & Chemical Sales, Inc.

The combined operation of these 14 sales outlets will cover fabricators in over 11 central and eastern states.

Sales offices were opened in Birmingham, Ala.; New Orleans, La.; Grand Rapids, Mich.; Tulsa, Okla. ,and Pittsburgh, Pa. Offices were also established in Miami, Fla.; Baltimore, Md.; Evansville, Ind., and Columbus, Ohio.

Distributors appointed by the company were: Earle M. Jorgensen Company, Houston and Dallas, Texas; Industrial Metals,, St. Louis, Mo.; Follansbee Metal Warehouses, Pittsburgh, Pa.; and Merrill Aluminum Corp., a subsidiary of the Merrill and Usher Company, Worcester, Mass.

**STURDY, RUGGED ALL STEEL CONSTRUCTION**

MASSIVE LINKS OCCUPYING ENTIRE SPACE BETWEEN TIEBARS ASSURE MAXIMUM LOCKING PRESSURE FOR OFF-CENTER DIES • SIX SHEAR POINTS MINIMIZE LINK PIN BREAKAGE

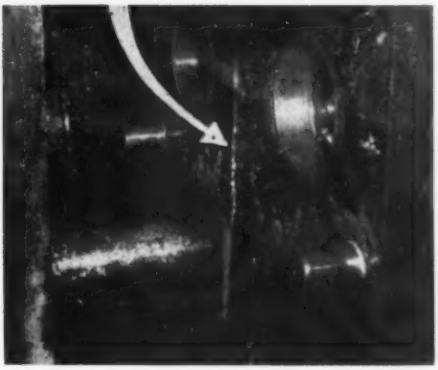
Hydraulic Core-Pull and Ejection Manifold mounted on movable plate. This permits core-pull cylinders to be piped in solid, eliminating all flexible hose.

COMPLETE SPECIFICATIONS ON REQUEST!

**CAST-MASTER**
*Die Casting Machines*

**CAST-MASTER, INC.** • 2123 HAMILTON AVE., CLEVELAND 14, OHIO

**1. HOLLOWED SPRUE** of this gate of small zinc die castings indicates that vacuum has been maintained throughout the piston withdrawal cycle so that all metal is sucked back from the sprue.



**2. DAMAGE TO DIES** results from metal drip such as this picture illustrates. Arrow points to drip of liquid metal at end of shot cycle which, if left in the die, might seriously impair the die halves.

# Drip-Control for DIE CASTING dies

A PROBLEM that has plagued die casters has been the small drip of metal from the casting sprue. This tail-end of the injection and plunger-withdrawal cycle has been responsible for damage to the die faces, thereby shortening the die life.

A study of the cause of this recurrent difficulty shows that the rapid movement of the shot plunger as it reaches the end of its retracting stroke breaks the vacuum within the shot sleeve before all of the liquid metal has been drawn back. This allows the last portion of the molten charge inside the sprue to drip down as the die opens.

If not noticed and removed by the machine operator, this metal drip is caught between the faces of the die halves as they close for the next shot, causing imperfect closing of the dies and sometimes damaging critical surfaces.

A recently developed hydraulic device has been introduced to overcome this damaging drip. Developed and manufactured by the Ring Valve Company it is known as the Ring No-Drip Control.

The effect of the unit is to apply a slowing action to the final part of the plunger withdrawal so that the vacuum action of the remaining metal is not broken until the plunger is completely withdrawn and the molten metal completely evacuated.

Thus, instead of leaving metal in the center of the sprue to drip down as the die is opened, the excess metal is sucked back and leaves the sprue dry. Figure 1 is a closeup view of a sprue on which this control action has been used.

Although the unit has been recently announced, it has been given four years of field testing in daily use at Grand Metal Products, who report more than a million shots without drip damage to the dies.

LETTERS TO THE EDITOR
continued from page 6

other than our present method of selling it as scrap.

I'm sending along a sample of this waste material for your analysis. With your knowledge of this subject and your contacts with manufacturers in this line, I feel sure that this problem can be solved.—R.P.

*Your problem connected with the better use of steel shot scrap is a recurring one in industry. A very considerable amount of work has been done on this material over the past several years.*

*Unfortunately, no good utilization of the scrap powder has been developed thus far. The composition is much too variable to allow its use except in those cases where a cast iron part is being replaced by powdered iron. The material, as you recover it, is much too hard to be pressed at economically usable pressures, and therefore requires annealing.*

*Generally speaking, the other people in the field with whom we have had contact find that the cost of annealing, sizing, blending, etc., is generally so high that they find themselves in direct competition with the iron powders now commercially available. Under these conditions, the variable composition and the impossibility of holding a consistent composition from batch to batch, makes your type of powder most unattractive. of powder unattractive.—Ed.*

"Take it with a grain of salt"..
We're all inclined to boast about the quality and superiority of our products. And those who hear or read our claims, naturally discount them accordingly. That's why we at Badger prefer to let the records speak for us—records which show that many leading manufacturers of household utensils have had Badger die cast their products for over 33 years.
Consult Badger on all your die casting problems.
BADGER
DIE CASTING CORP.
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## DIE CASTING DIES BY INVESTMENT CASTING

Is it possible to secure further information pertaining to investment castings insofar as it concerns die cast moulds?—F.W.W.

*A portion of the article concerning a die cast spray gun in May PMM describes the production of a die casting die cavity by investment casting (page 84). Name of the company producing these investment cast die cavities has been forwarded.*

*Also of interest to you may be the article in August die cavities beryllium copper die cavities for die casting.—Ed.*

## HIGH DENSITY IRON POWDER

Our attention has been drawn to the fact that Mr. Philip R. Kalischer has published in your May 1952 edition of "Precision Metal Molding" an article under the heading "Pioneers in High Density Iron Powder Parts." We would be very interested in getting one copy of the May booklet—K. D. (Germany)

*Copy forwarded.—Ed.*

### BUILD MODEL SHOP

A completely equipped shop with necessary facilities for making production prototype models of products ranging from rat traps to refrigerators is to be included in the new building of Sunberg-Ferar, industrial designers, now under construction in Royal Oak, Mich., it has been announced.

---

### TOLEDO UNIVERSITY OFFERS TOOL ENGINEER COURSE

A four year course in tool engineering will be offered by Toledo University when its fall sessions begin on September 11 of this year. The curriculum, which was developed in cooperation with Toledo Chapter No. 9 of the American Society of Tool Engineers, is open to high school graduates.

A certificate of Associate in


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QUALITY PRODUCTS SINCE 1910
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is your small parts problem here ?

ACTUAL SIZE
THE CASE OF THE DIFFICULT ASSEMBLY
Mounting plates for variable controls widely used in electronic equipment were originally two-piece assemblies of brass screw machine parts and sheet stampings. Gries die cast the complicated part in one simple piece for easy assembly at a big saving. GRIES zinc alloy parts can do a better job for you, too! Exclusive facilities produce simple or intricate tiny parts in one automatic operation . . . completely trimmed, ready for use . . . 100,000 parts to many millions.

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- Economy
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TINY ZINC DIE CASTINGS
SMALLNESS UNLIMITED
Max. Wt. ½ oz.
Max. Lgth. 1¾"

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Industrial Science will be granted to those completing the course. Forty-three of the 56 credit hours in the curriculum can be applied toward a degree in engineering.

According to L. B. Bellamy, national president of the American Society of Tool Engineers, the tool engineering curriculum at Toledo University is one of many being initiated in colleges and universities through the efforts of the National Education Committee and individual chapters of the ASTE to help alleviate the national shortage of trained production engineers.

The entire Toledo University program can be completed in four years of evening session attendance and thus can be utilized by junior tool engineers already employed in some phase of tool engineering and who desire further basic grounding in their field of work.

Large or Small . . .
SIMPLE OR COMPLEX
• Accurate can supply you with precision die castings when, how and where you need them. May we help you with yours?
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**C. C. CARR DIES**

Charles Carl Carr, who retired in 1949 as director of public relations and advertising for Aluminum Company of America died suddenly July 29, of a heart attack, in St. Petersburg, Florida, where he has resided since retiring from ALCOA.

## OPPORTUNITIES

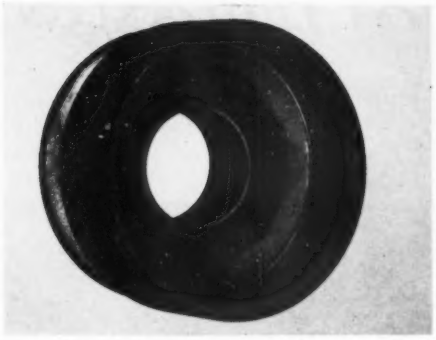
POWDER METALLURGIST:
Excellent opening for research metallurgist interested in powder metallurgy. Sound metallurgy background and some powder metallurgy experience essential. Outstanding opportunity to advance personally and professionally in growing organization. Salary commensurate with background and experience of candidate.

Metals Department
Armour Research Foundation
of
Illinois Institute of Technology
Chicago 16, Illinois

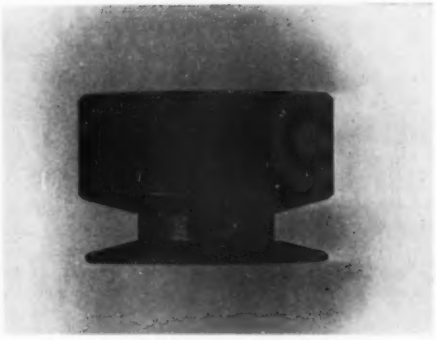
HELP WANTED:
We have openings for capable representatives in metropolitan N. Y., north and south N. Y., eastern Penna., Delaware and Maryland.
Applicants must have good following in the die and mold field and be able to demonstrate the Di-Profiler in the shops. Men with 2 or 3 other items can increase their income considerably.
Please address replies to Nord International Corp., P. O. Box 44, Denville, N. J., or phone Rockaway (N. J.) 9-3199.

FOR SALE:
One Lindberg-Fisher Electric Induction Stationary Holding Furnace for Aluminum; 40 KW, 230 volts, 60 cycle, single phase. Complete with control panel and control equipment. Write Box 9252, Precision Metal Molding Magazine.

EXPERIENCED PROCESS ENGINEER and metallurgist wants position in powdered metal field. Can set up, or operate, a complete powdered metal department. Prefer the West Coast. Active now in above work. Write Box 9152, Precision Metal Molding Magazine.



Top view shows the braze . . .



. . . side view shows the flange.

# Brazing and sintering-one operation with POWDER METALLURGY

SIMULTANEOUS brazing and sintering of assemblies of pressed components is a powder metallurgy technique often overlooked or unknown to the machine designer.

Illustrated is a good example of such an assembled piece made by the Wel-Met Company of Kent, Ohio. To make this piece two compacts are pressed from iron powder; the cup shaped member and the flanged shank. Prior to sintering these two green compacts are pressed together and either a copper ring or copper powder placed in the annular groove formed around the shank. Sintering is carried out in the usual manner at a temperature high enough to melt the copper.

Generally, no supports or fixtures are needed during the sintering since the original press fit coupled with the normal shrinkage during sintering will maintain the parts in position.

The natural porosity of the iron compacts helps to furnish a good bond for the brazing material so that the joint as made by this process is probably considerably stronger than any other portion of the piece and may, in fact, be stronger than the average copper brazed joint.

If this part were to be made by machining from bar stock an original piece of metal weighing from 27 to 28 ounces would be required to produce the final piece weighing only 6½ ounces, a loss of almost 75 percent of the metal. As an alternative method of fabricating, three parts could be made, the cup, a shank, and the flange. The three pieces then assembled by furnace brazing or welding. In the second case of welding, a secondary machining operation would probably be required. In either case, the cost would be considerably greater by standard shop methods than by powder metallurgy.

The part shown carries a self lubricating bronze bushing that is pressed in after the hub has been sintered and brazed.

A further advantage to be gained by the use of powder metallurgical methods in the production of parts similar to the one shown is that dissimilar metals or mixtures with special properties can be incorporated in the assembly.

For example, the hub under discussion is a clutch housing. The cup shaped member could be made of special friction material and still assembled by a combined sintering and brazing operation if such properties were desirable.

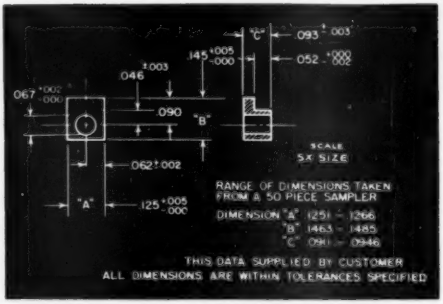
Materials of different degrees of porosity could also be incorporated into a single assembly. In this case, if it were desirable, the cup of the housing could be a relatively high density material while the flange and shank could be of lower density. In this manner, the shank could operate as a self lubricating bearing without having appreciable porosity in the cup.

A wide range of these variations is quite possible if the designer will bear in mind that assembly such as described can be done. In the case of non-ferrous metals the same procedures can be followed providing only that a brazing material of suitable melting point be used.

# *SIMPLIFIED SOLUTIONS*

## *for production problems*

**REPLACING A 2-PIECE ASSEMBLY,** the small die cast zinc mounting bushing, right, has cut costs and given a more rigid piece than its predecessor. It was formerly made of a screw machine part and a brass stamping. The manufacturer turned to a zinc die casting to reduce costs, to eliminate an awkward assembly, and to get a one-piece mounting bushing. It is being produced now by Gries Reproducer Corp. of New York City. It is shown as die cast at the lower right, and as previously fabricated in the complete assembly at the left.




**NOW PRESSED** from nickel silver powder, replacing a machined part made from either brass or steel and cadmium plated; the aircraft Gyro clamp, above, is typical of the substitution going on in the metal forming industry.

By converting to powder metallurgy as a manufacturing method the Kearfott Co. of Little Falls, N. J. has not only realized a cost saving of 88 percent as compared with the former cost, but more importantly now secure parts that are dimensionally more uniform than was possible before. The inspection report of a fifty piece sample (see illustration) shows that on three critical dimensions checked the variation in every cast was only a fraction of the allowable shift. This accuracy immediately demonstrates that a very considerable reduction in inspection load can be made.

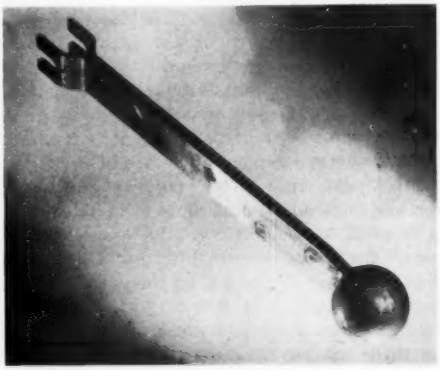
In addition to the dimensional accuracy shown, the fabricator of the clamp, the Joseph Dixon Crucible Co., of Jersey City, N. J. is able to hold all dimensions on the part well within the drawing specifications.

Another saving made possible by the conversion to powder metallurgy is the freeing of machines for other work. While it is difficult to translate such a saving into dollars, it is still a very real one.

**A SHIFT LEVER** is generally thought of as a nicely shaped rod terminated by a plastic knob carefully shaped to fit the fingers. When a shift lever goes on a tractor, however, it has to be a rugged piece of equipment, particularly since a majority of tractor operators like to shift with their feet.

One prominent tractor manufacturer has solved the problem of bending and breakage of shift levers by making them of two pieces of ⅛ x ⅞ steel, shaped to fit the particular job and spot welded together. The knob is die cast zinc with the steel lever as an insert. To secure adequate anchorage of the zinc ball to the steel bar a hole is drilled in the steel prior to casting the knob.

The shift lever illustrated is made by the Racine Die Casting Co. of Racine, Wis.



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Scale ½"=1⅛ App.

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## Machined? or Cast?

**PRECISION INVESTMENT CASTINGS**

- cast centrifugally
- models and molds made by us
- non-ferrous only
- sample delivery three weeks from receipt of order

*Send blueprints or samples to Home Office for prompt quotations.*

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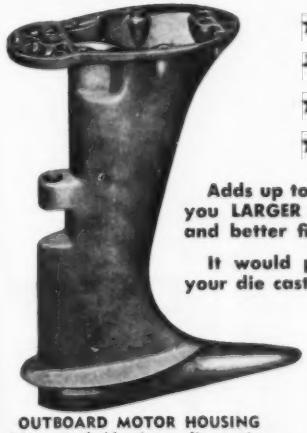

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OUTBOARD MOTOR HOUSING
5½ pound Aluminum die casting
17 inches high

*Aluminum and Zinc Alloys*

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Complete machining, polishing and assembly facilities

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**Close control** at every step in our production assures you of better, more consistent workmanship. Accurate details, fine surfaces and complete filling of molds are the rule, when you make your castings in P-V Investments.

**Tons of P-V Investments** are used daily by leading precision casters using the expendable pattern method. Our engineers have over 10 years' experience in this art—can advise on your investment casting problems.

**Prompt shipment** can be made from our new modern plant. And P-V Investments are *priced right!* Write, wire or phone for this sample, prices and additional information.

PRE-VEST inc.
23432 LAKELAND BLVD.
CLEVELAND-17, OHIO

PURCHASING AGENT
continued from page 34

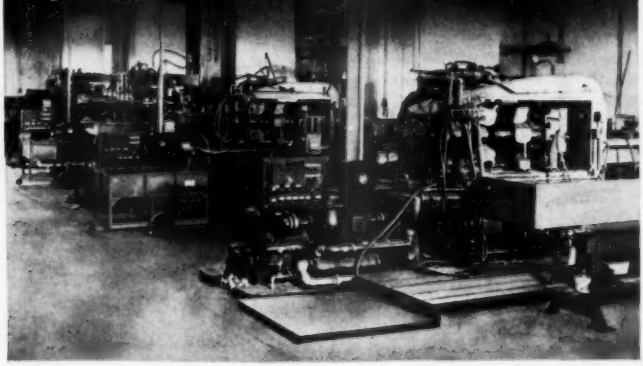
on a trimmed casting, a semi-machined casting or a fully finished casting. These various bids are carefully weighed and of the die casters who bid, the contract goes to the one that gives the lowest **final** cost.

It does not necessarily mean that the contract goes to the lowest bidder. In many cases, machining a casting will mean the installation of special machines by Servel which the foundry already has. Machining by Servel may also mean installation of new machine tools, even though they are standard, whereas machining by the foundry obviates such purchases. All these points are considered when awarding a contract. With these considerations, it is obvious that the apparent low bidder is not necessarily given the job.

When all these factors are considered, Servel has found that within their market area, there are only a limited number of foundries capable of supplying them with castings that will meet their requirements.

When one considers all of the varied knowledge and abilities needed by a purchasing agent who buys die castings, the most obvious

Capacity FOR THE ULTIMATE IN DIE CASTING



NE

A section of high-pressure aluminum casting machines (cold chamber) illustrates one of the many modern production methods that is part of our complete die casting services.

THE NEW ENGLAND DIE CASTING CO.
445 Front Avenue West Haven, Conn.

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RACINE

ZINC OR ALUMINUM die castings of highest quality produced on modern, fast equipment. Guaranteed satisfaction. Prompt service.

*Inquiries Invited*

Tell us your needs. Send blueprints or drawings for quotation. No obligation, of course.

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1500 16TH ST., RACINE, WIS.

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question that comes up is—what are his personal qualifications?

As a starting point, engineering training is a help. He should have some knowledge of machine shop practices and above all, he must be the type of individual who can "win friends and influence people." Without the ability to make and use friends (and in return be used by them), the purchasing agent is little more than a clerk. It is largely friendship in the industry that enables him to draw on the technical skill and know-how of the die casters and he must be ready and willing to return these favors so long as they in no way influence his final decisions.

### NEW MAGNETIC MATERIAL DEVELOPED BY NAVAL ORDNANCE

A new magnetic material developed by Naval Ordnance Laboratories, White Oak, Md., exhibits coercive force of 3,000 coersteds, greater than any known permanent magnetic material, it has been reported.

Composition of the material includes bismuth and manganese, and pieces are fabricated by powder metallurgy techniques. The powdered metals are heated to 700C and hot pressing the resulting bismuthide at 300c in a strong magnetic field. Details are available from Navy Technical News, Office of Information, Navy Department, Washington 25, D. C.


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**PRESSURE CASTINGS**
**Economically**

A positive, low-cost method of impregnating pressure castings to meet the most rigid specifications. Pressure castings impregnated with this equipment have been successfully subjected to severe tests with hot kerosene, hot oil, hot water and other solutions under pressure, with no evidence of porosity remaining.

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If your contract calls for casting impregnation, get the facts on this MOGULLIZER packaged plant which utilizes both pressure and vacuum stages.

Write today for free literature and recommendations for your casting salvage problems.

NOTE: There are job shops in certain areas who can take care of your contract work. A few territories are still open for job shop installation. Write for set-up plan today.

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This quality die casting is the "off - on" switch for an electric range.

LET us show you the amazing savings in production costs that Yoder die casting and imagination offer you. Consult with our skilled staff on your production problems. Call, wire, or write today!

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**DIE CASTING, INC.**
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the oversize parts are discharged from the top of the screen, while processing chips go through the screen and discharge into a Hoist Pan below. The amount of agitation is controlled by a variable stroke adjustment. Screens are available in mesh sizes of 1/16" to 1½" and correspond to Roto-Finish chip sizes. Screen size is 34" x 27".

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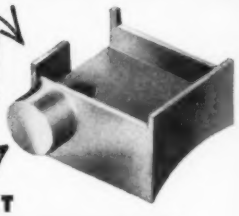

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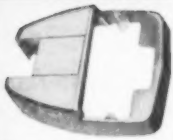

Portable Equipment

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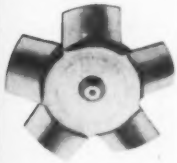

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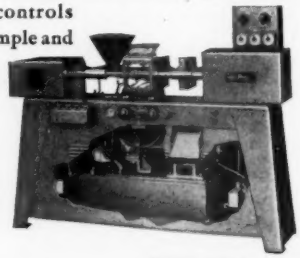

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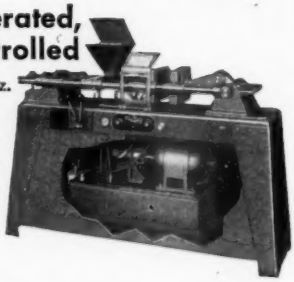

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